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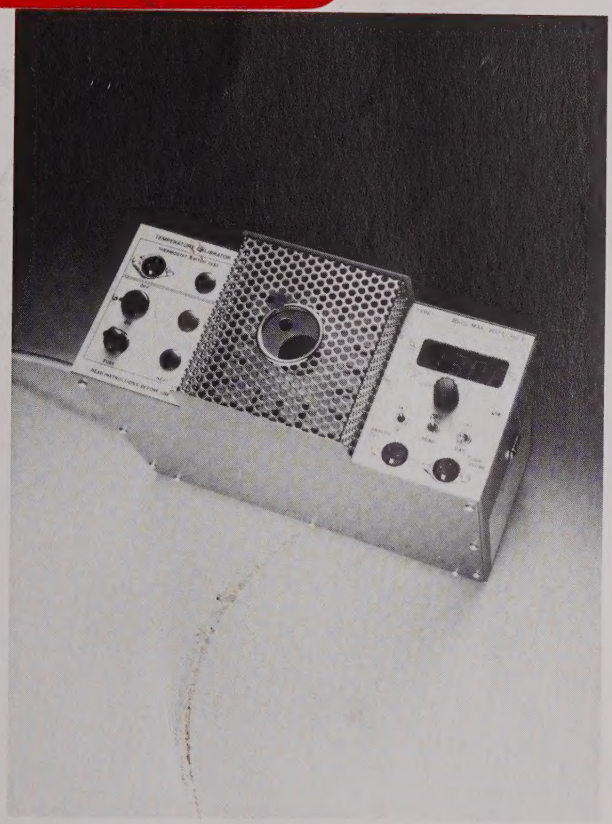

service manual

model 200 S
- 200 S-2
- 200 S-3
- 600 S
- 600 S-2

Issue: April 1987

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Giro 5 89 06 16 . Bank: Den Danske Bank . ASreg. nr. 66818

This manual applies to standard units only from S/N 60000.

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SERVICE MANUAL for Model 200 S/ 600 S

INTRODUCTION

Accurate temperature measurements can be assured only when it is possible physically to produce a legitimate basis for establishing traceability to temperature standards.

The Model 200 S/ 600 S temperature calibrators which are units out of a series of temperature and pressure calibration instruments, ranging from -50°C/-58°F to +600°C/1112°F and 0-10.000 p.s.i., has been designed with the philosophy of all our temperature calibrators, namely, physically to bring each sensor to a series of pre-determined temperatures and calibrate display/ recorder or thermostats accordingly.

The Model 200 S/ 600 S may be used for all temperature sensors, incl. RTD's and thermocouplers.

The Model 200 S/ 600 S gives the user the availability to calibrate the complete temperature system from sensor to indicator.

The use of Model 200 S/ 600 S offers a number of great advantages above alternative methods of temperature calibration, but requests that any user reads the instruction for use very carefully, and is aware of the fact that high temperature has to be handled with care, and only in areas without hazardous fumes or fire risks, and get acquainted with all facilities offered by this field calibrator.

TECHNICAL DATA

Heating Performance

The heating block is made from specially produced metal to achieve optimum heat conductivity, and is heated by resistance heating elements. They are electronically controlled and regulated by a potentiometer on the front panel. The temperature is controlled through a precision platinum resistance thermometer (RTD sensor) and a closed loop circuit.

For other than standard-versions see data sheet for these versions (200 S-2, 200 S-3, 600 S-2).

Performance data

Standard version	200 S	600 S
Range °C/° F	amb. to 200/392	amb. to 600/1112
Resolution °C/°F	0,1	1
Accuracy °C/°F	+- 0,75/1,5	+- 2/4
Stability °C/°F	+- 0,1/0,2	+- 0,5/1
Heating time	See fig. 1. Curve A, Drawing No.: 4H01	
Cooling time	See fig. 1. Curve B, Drawing No.: 4L11	

Electrical data

Power consumption	1000 Watts max.	1200 Watts max.
Voltage supply	220 V AC, 115 V AC, +/- 10%	
Voltage frequency	50/60 Hz	
Fuse, F 1/4" x 1 1/4"	6.3 A at 220 V AC	
	10.0 A at 115 V AC	
Analog output	10 mV/degr. C. or F.	
External probe	RTD, PT-1000 type	
Thermostat test	- 7 V DC, nominal	

INSTRUCTION FOR USE

General Information

The Model 200 S/ 600 S must be used outside the case with the air inlet in the bottom clear of obstruction.

The instrument has a built in thermal protector (thermo switch) which automatically disables the unit. It will automatically reset, when the temperature of the chassis is below pre-set temperature.

A data sticker is mounted on the instrument.

Please check voltage of instrument before use.

Before each calibration clean the well and insertion tube, to secure optimum contact to instrument and sensor.

Choose right size insertion tube for the sensor to be tested. Place insertion tube in calibrator. Heat conducting oil/paste must not be used for temperatures exceeding 250°C/482°F. Insulation of the sensing element, which is out of the insertion tube, may be carried out if required, by means of wrapping heat resistant insulating material around the sensing element.

Thermo head and/or upper junction between lead wire/heat must be placed outside outer heat shield to avoid false readings.

Allow 5-10 minutes after the read temperature has become stable to secure optimum heat transfer to the sensor before starting calibration.

- See also user's manual for full instructions.

FUNCTIONAL DESCRIPTION

See fig. 2, block diagram, drawing No.: 4H43, 4L45

Adjust desired temperature by means of the "Set" potentiometer, which via a buffer gives a voltage proportional to the adjusted temperature. This voltage goes to input "S" on a differential amplifier, and it can be read on the display, when the switch is in position "Set".

A temperature detector gives a voltage equal to the actual temperature in the heating well. This voltage is passed to a linearizing circuit, which gives a voltage proportional to the temperature in the heating well. This voltage is fed to input "R" on above-mentioned differential amplifier. Temperature can be read on the display when the switch is on "Read".

The output voltage of the differential amplifier, which is the difference between set and actual temperature in the heating well, is passed to an "Optocoupler". To increase safety, the Optocoupler creates a barrier between the low voltage circuit and the high voltage circuit.

The output voltage of the "Optocoupler" is proportional to the output voltage of the differential amplifier, and is fed to a voltage regulator, working as a proportional band regulator for the voltage to the heating elements.

The function of this proportional band regulator is shown on fig. 3.

"P mean" is the power that is supplied to the heating elements.

A safety thermal protection is placed in thermal contact with the heating well and switches off heating elements, when its temperature exceeds the rated value.

When the "set" temperature is lower than the "read" temperature, the output voltage of the differential amplifier will become negative, and the optocoupler will start the fan via a zero-crossing detector (200 S only).

On 600 S only, the fan is operating continuously.

PERFORMANCE TEST

To check the accuracy of Model 200 S/ 600 S following procedure may be used:

Place a traceable precision thermometer in the heating well, and secure a good thermal contact. Insulate the portion of the thermometer that is above the heating well, and use the heating shield to prevent overheating of the probe head.

Set the desired temperature and allow unit to stabilize, adjust for any difference between "Set" and "Read" value.

You may use the calibration control form enclosed.

If out of tolerance, refer to "Calibration Procedure".

TROUBLE-SHOOTING

Identify the calibrator for model description, line voltage, and PCB-versions, according to the drawings attached.

See fig. 4, 5, and 6. Check all connections and that connectors are in place.

Pilot lamp out.

Is there line voltage to the unit?		
Has the unit not been turned on?		
Fuse defect?		
Thermal protection activated	200 S: 600 S:	Replace Let the unit cool down and find the reason as for blocked ventilation.
Pilot lamp defect?		Replace

Unit does not heat.

Switch is on "Ext."	Switch to "Int."
"Read" shows too high value	Replace internal RTD - PT 1000 temperature sensor
"Heat" lamp on, doesn't heat	Check heating elements
If voltage on terminal 14 is positive	Replace power board
If above voltage is negative	Replace process board

Unit is heating when "Set" is less than "Read".

Set switch in position "Ext", unit still heats	Replace power board
Unit is heating when "Set" is less than "Read" and switch is on "Int"	Examine temperature sensor, if all right replace process board

Thermo-switch test pilot lamp does not light.

Pilot lamp defect	Replace
Test wire defect	Repair or replace

Fan does not run when "Set" is less than "Read".

Fan blocked	Remove obstruction
Fan defective	Replace

200 S only:

Voltage on CN1 pin 2 is -1V	Replace power board
Same voltage is not appr. -1V	Replace process board

Display, one or more segments do not light.

Defective digit	Replace display board
Defective integrated circuit	Replace display board
Defective printed circuit	Replace display board

Calibration Procedure for Model 200 S/ 600 S

See fig. 4, 5, and 6.

Recommended equipment:

1. Resistance decade box adjustable to 1000.0 ohms, 1616.5 ohms, 1758.4 ohms and 3136.5 ohms with an error of less than 0.5 ohms equal to approx. 0.143°C/0.257°F. The box can be supplied from factory.

   Alternative:

   4 resistors with above mentioned values.

2. Digital voltmeter 4 1/2 Digits, resolution 0.1 mV min. and an accuracy better than +/- (0.05% rdg. + 2 dg.)

3. Traceable and stable precision thermometer with an accuracy better than 0.1°C/0.18°F in the entire range for the model to be tested.

Note:

The factory calibration certificate and warranty do not apply when recalibrating the unit without factory acceptance, or the factory seals of the settings are broken.

ADJUSTMENTS:

A. Thermal power adjustment.

B. RTD "offset" adjustment.

C. RTD "gain" adjustment.

D. Heat signal.

E. Set value.

F. Degree F conversion.

G. Fine calibration.

H. Set value calibration

Note:

This manual applies to different versions of the calibrators, basically with 3 boards containing 13 potentiometers.

Switch Positions

A. Thermal Power Adjustment

°C/Read/Ext.

Adjust P12 until just no flash in heat pilot plus one more turn CCW (no light).

B. RTD Offset Adjustment

°C/Read/Ext.

1)
Set decade to 1616,5 ohm and connect decade and DVM to ext. probe socket pin 1 and pin 3.

Adjust P5 to 1.6165 V.

2)
Reconnect DVM between ext. probe socket pin 3 and analog out socket pin 1.

Adjust P3 to 1.6165 V.

Repeat 1) and 2) until balance is achieved.

C. RTD Gain Adjustment

°C/Read/Ext.

Set decade to 1000 ohms for 200 S or to 3136.5 ohms for 600 S.

Reconnect DVM from analog socket pin 1 to analog socket pin 4.

C1/200 S: Adjust P6 to 0.000 V
C1/600 S: Adjust P6 to 6.000 V

C2/200 S: Set decade to 1758.4 ohms.
Adjust P13 to display 200.0°C

C2/600 S: Adjust P13 to display 600°C
(decade on 3136.5 ohms.)

Disconnect DVM and decade.

Switch Positions

D. Heat Signal Adjustment

°C/Read/Int.

Turn set-potentiometer CW to max.

D1: Adjust P1 from flashing heat pilot lamp to just constant light plus 1 turn CCW (constant light).

Set up the unit and allow it to stabilize on the set temperature.

D2: Adjust P1 so that 5,5 VDC + - 0,5 V is obtained between pin 8 on IC2 and ground. Turn CCW for lower voltage and allow the unit and voltage to stabilize between every measurement.

E. Set Value Adjustments

°C/Set/Ext.

Set-potentiometer should be on max.

E1:200 S: Adjust P7 to display 205°C
E1:600 S: Adjust P7 to display 605°C

F. Degree C to F Conversation

Turn set-potentiometer CCW to min. 0°C

0°F/Set/Ext.

F1: Adjust P2 to display 32F

0°C/Set/Ext.

Turn set-potentiometer CW to 200.0°C/600°C

°F/Set/Ext.

F2:200 S: Adjust P4 to display 392.0F

F2:600 S: Adjust P4 to display 1112 F

Repeat F1 and F2 until balance is achieved.

G. Calibration

°C/Read/Int.

Set up the unit at max. rating with the precision thermometer and the right sized insertion tube placed in the heating well. Allow time for stabilization.

G1: Adjust P13 to display exactly the same value as the precision thermometer in ° C.

H. Set Value Calibration

Keep the unit stable on max. rating from item G and note the read-value.

°C/Set/Int.

H1: Adjust P8 quickly to display the same set-value as the previous read-value.

This adjustment influences the entire regulation system and must be carried out over a few seconds, as the unit will try to reach another point of balance.

Note: Calibrations must be carried out with side-plates mounted. Use an extra set of side-plates with adjustment holes drilled. These can be obtained from the factory.

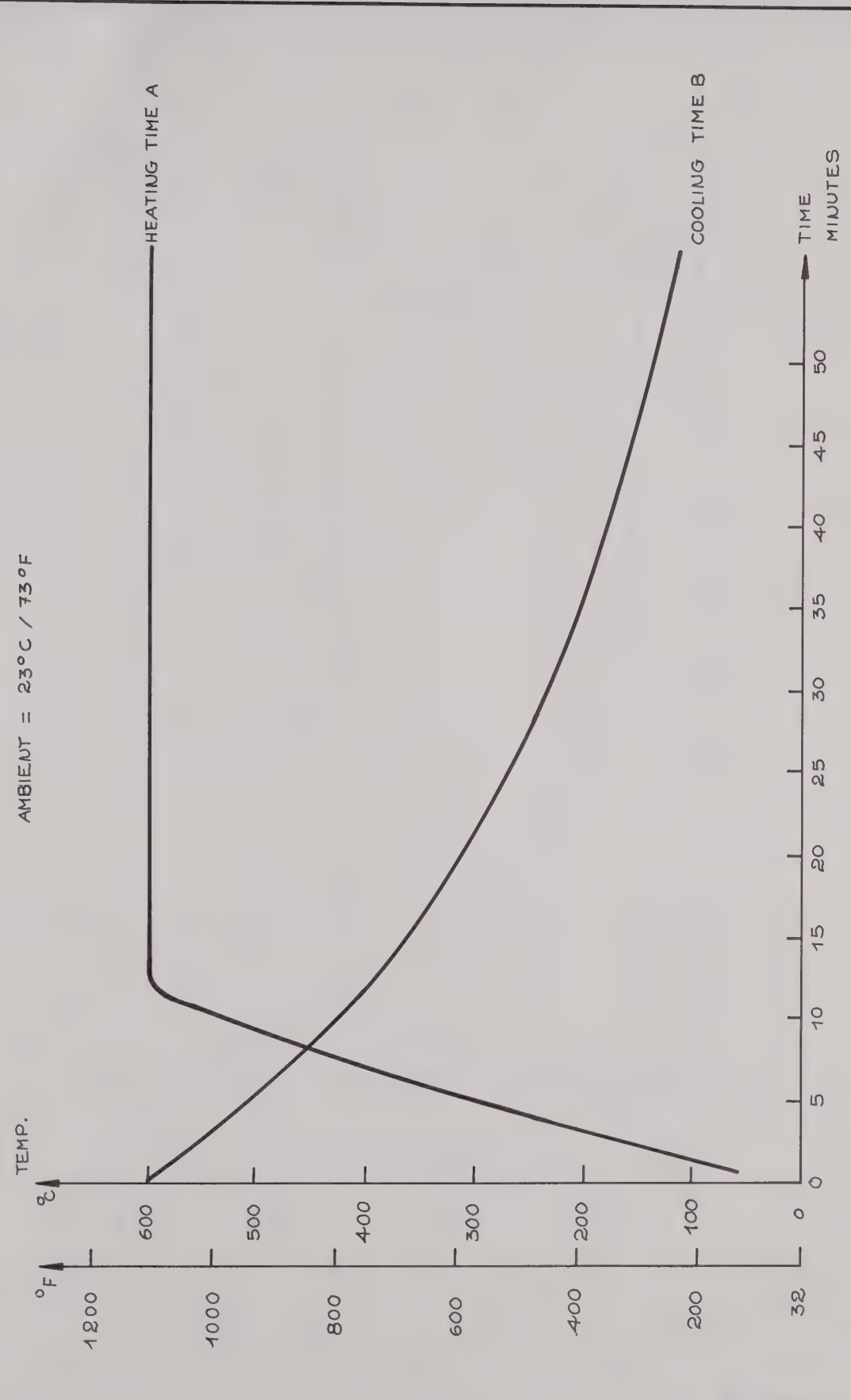


FIG. 1a

Model: 600S	Konf.:	JLO	Revision:				JOFRA INSTRUMENTS AS
	Tegn:	IL	IL	VAN			
Emne: HEATING - AND COOLING TIME	Dato:	11.84	11.84	11.86			Tegn nr.: 4H01

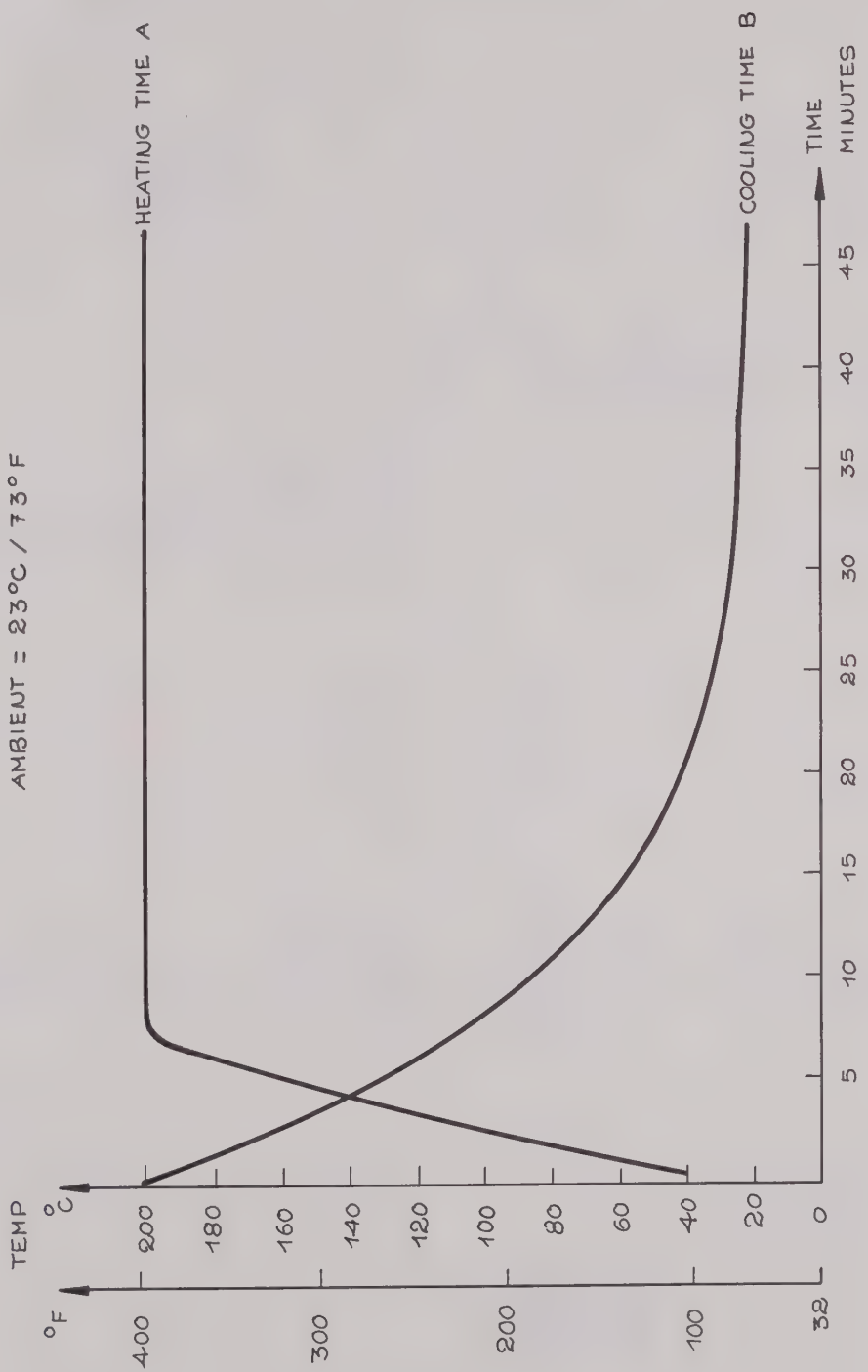


FIG. 1b

Model: 200S	Konf.:	JLO	Revision:				JOFRA INSTRUMENTS A/S
	Tegn:	IL	VAN				
Emne: HEATING AND COOLINGTIME	Dato:	12.84	11.86				Tegn nr.: 4L11

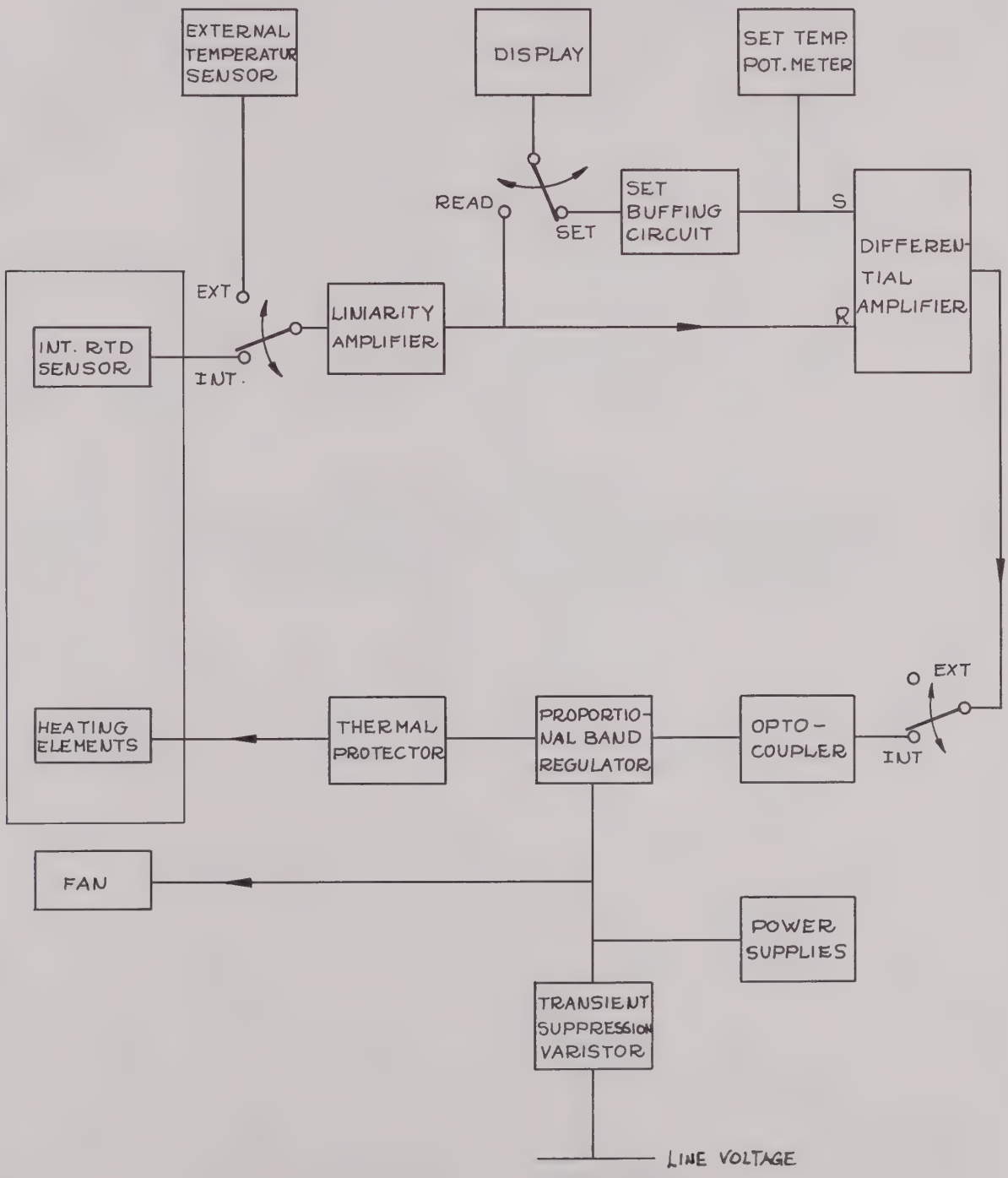


FIG. 20

Model: 600 S ALL VERSIONS	Konf.:	JLO	Revision:				JOFRA INSTRUMENTS AS
	Tegn:	VAN					
Emne: BLOKDIAGRAM	Dato:	8/86	30/4 -87				Tegn nr.: 4H43

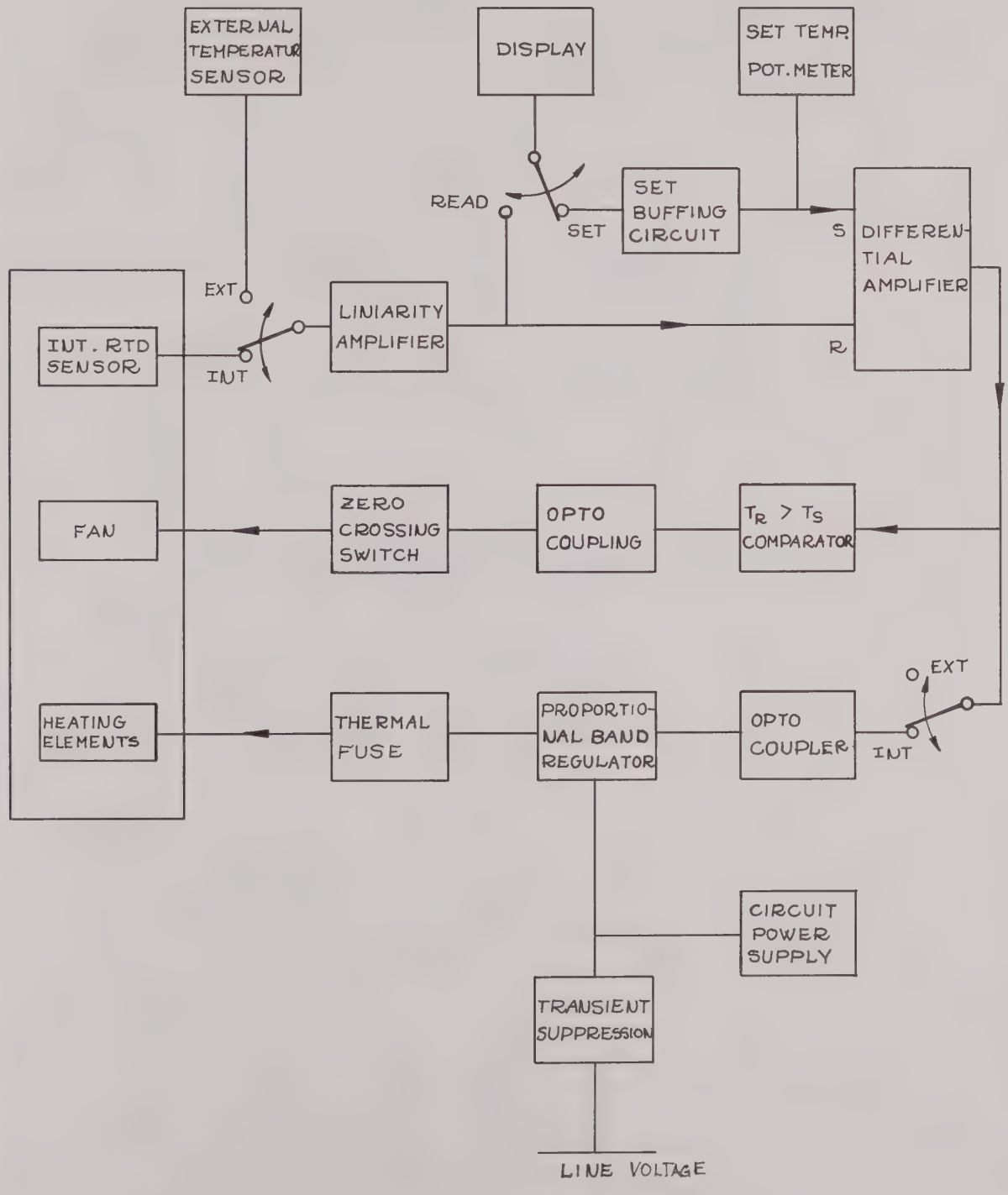
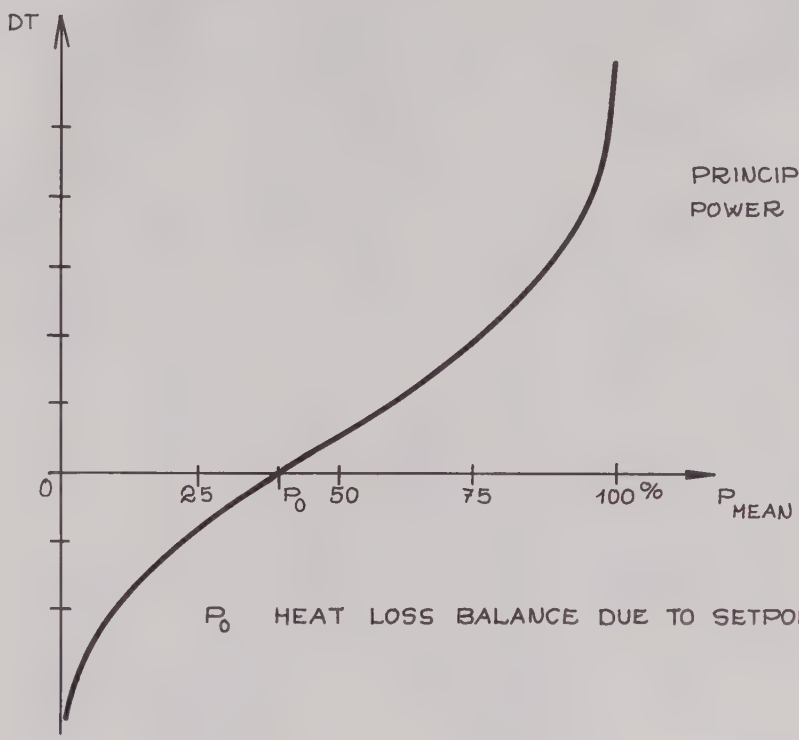


FIG. 2b

Model: 200 S ALL VERSION	Konf.:	JLO	Revision:			JOFRA INSTRUMENTS AS
	Tegn:	VAN	JLO			
Emne: BLOKDIAGRAM	Dato:	5/86	27/4 -87			Tegn nr.: 4L45

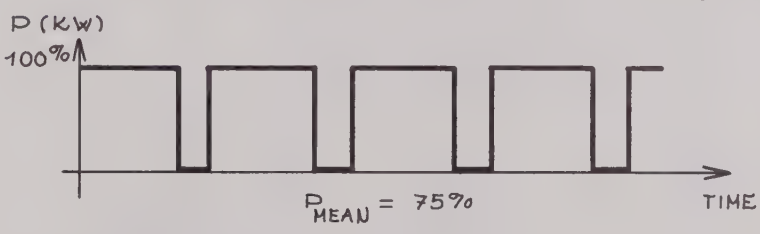
DT = DIFFERENCE BETW. SET AND READ TEMPERATURE

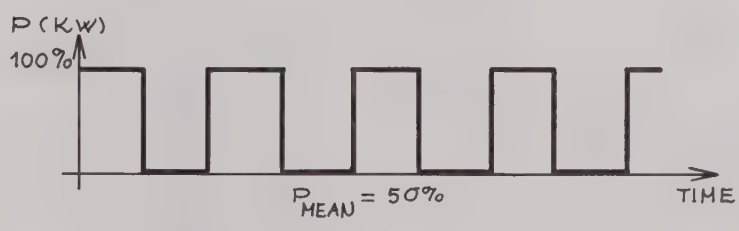


PRINCIPLE CURVE FOR THERMAL POWER RELATIONS TO DT.

P_0 HEAT LOSS BALANCE DUE TO SETPOINT AND AMBIENT.

THE MEAN POWER IS OBTAINED BY VARYING THE DUTY-CYCLE PROPORTIONAL TO DT AS ILLUSTRADED BELOW.





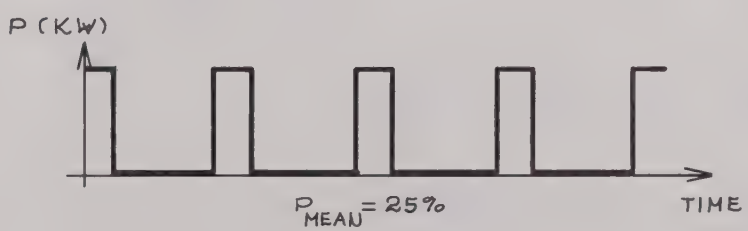
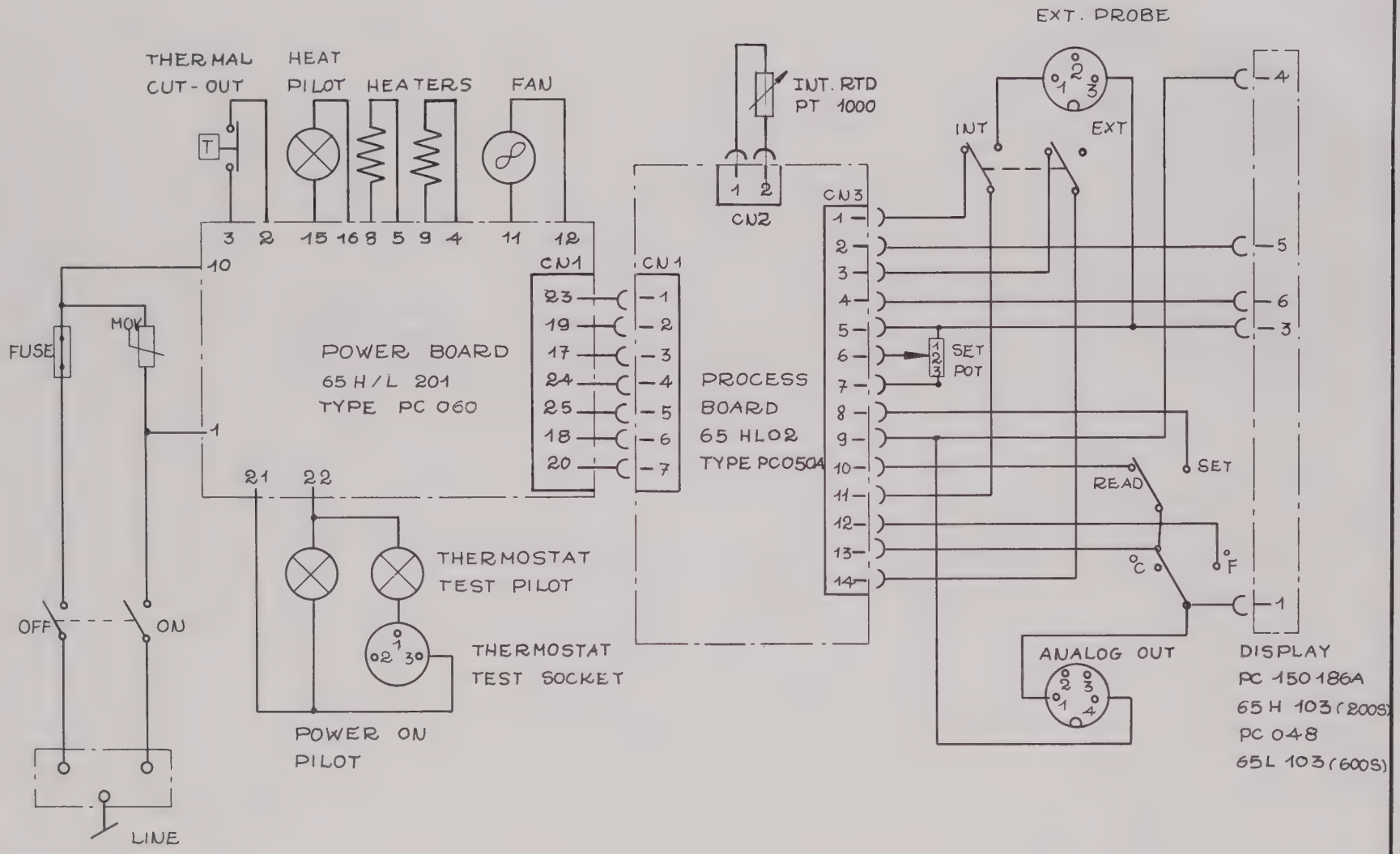


FIG. 3

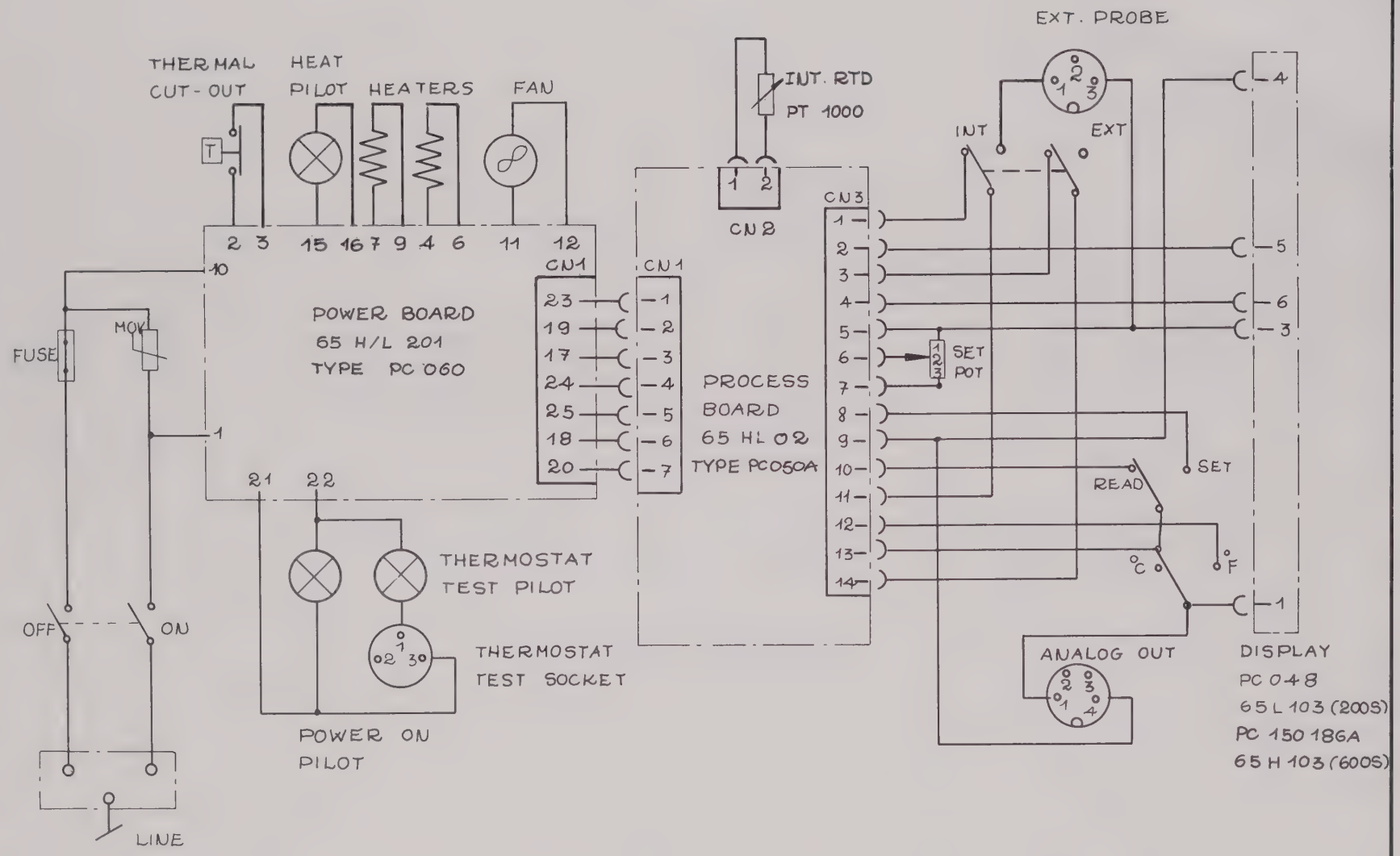
Model: 200 / 600 ALL VERSIONS		Konf.:	JLO	Revision:				JOFRA INSTRUMENTS AS
		Tegn:	VAN					
Emne: PROPORTIONAL HEAT CONTROL		Dato:	6/86					Tegn nr.: 4HL40



NOTE : CONNECTION 19 TO 2 ONLY FOR 200S

FIG. 4 a

Emne: WIRING DIAGRAM	Model: 200 S / 600 S 115V		
		Konf.	JLO
	Tegn.	VAN	
	Dato:	10.86	
			Revision:
Tegn nr 4HL41	JOHN FLUKE INSTRUMENTS		



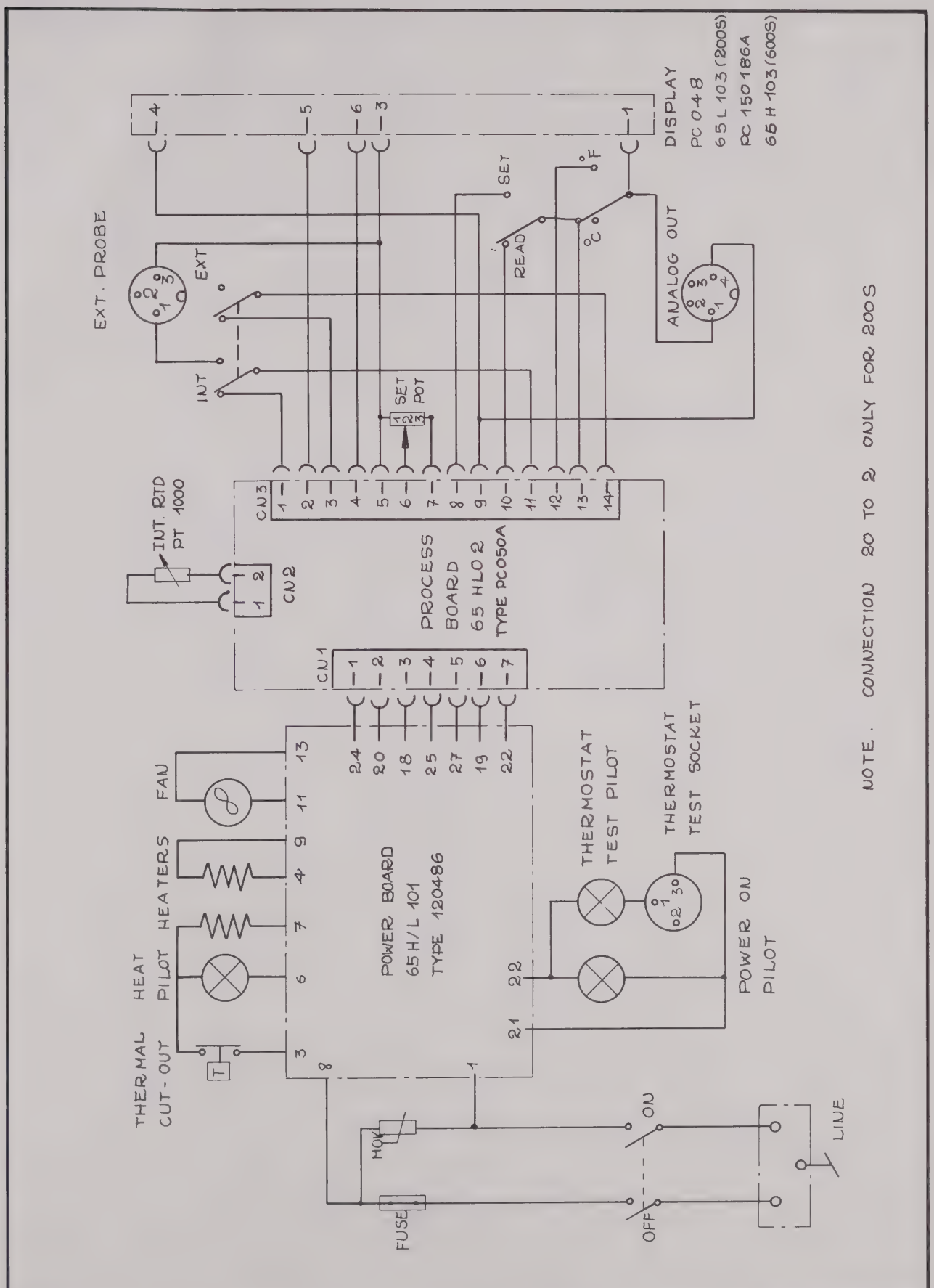
NOTE : CONNECTION 19 TO 2 ONLY FOR 200S

FIG. 4b

Model	600S / 200S 220V
Emne	WIRING DIAGRAM
Kont	JLO
Tegn	VAN
Dato	10.86
Revision	
Tegn nr	4HL37

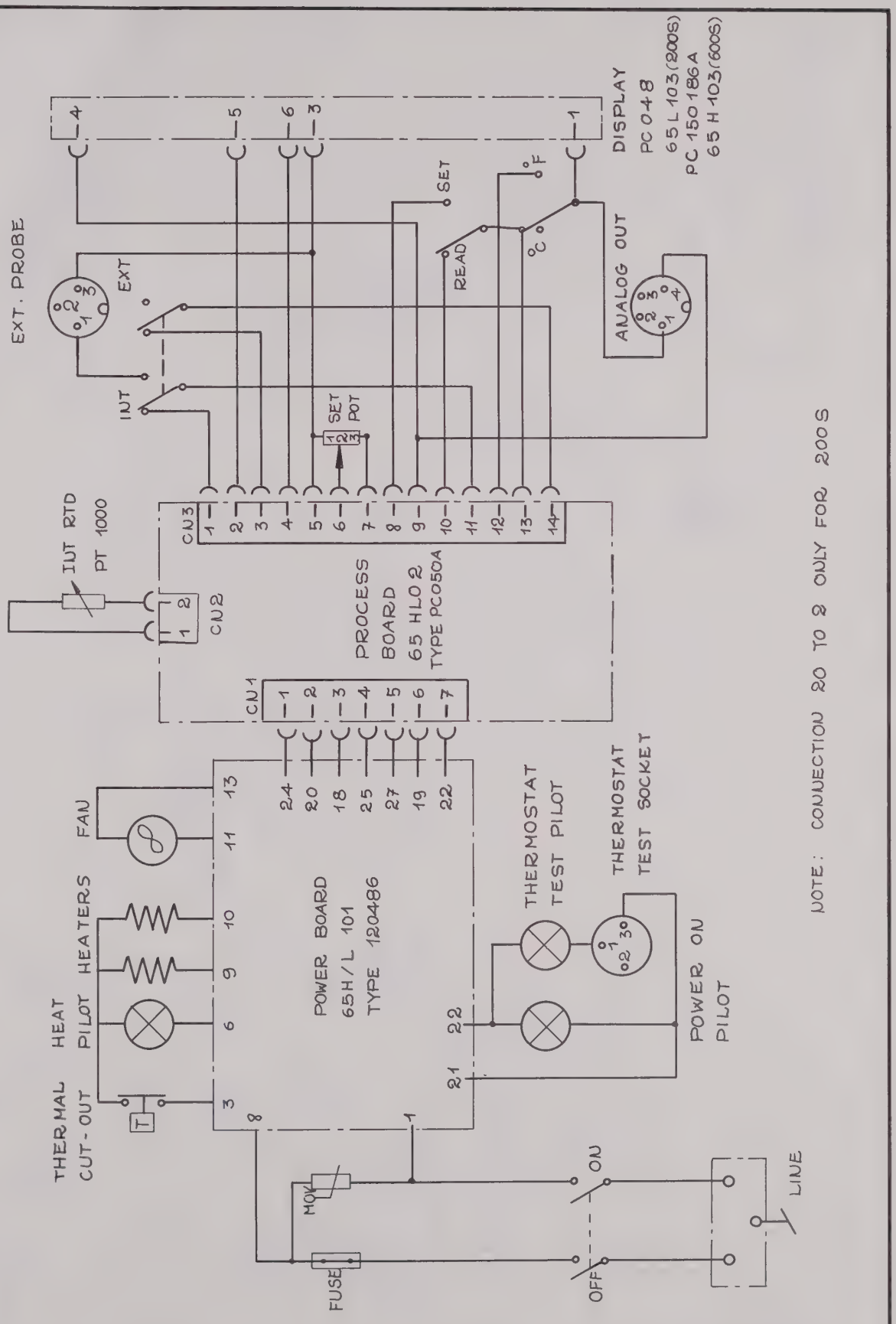
JOFRA INSTRUMENTS

From s/n 63000 to 70000



Model	600S / 200S 220V	Konf	JLO	Revision		JOFRA INSTRUMENTS AS
		Tegn	VAN			
Emne	WIRING DIAGRAM	Dato	8/86			Tegn nr 4HL38

From s/n 63000 to 70000



Model: 600S / 200S 115V	Konf.:	JLO	Revision:				JOFRA INSTRUMENTS A/S
	Tegn:	VAN					
Emne: WIRING DIAGRAM	Dato:	8/86					Tegn nr.: 4HL39

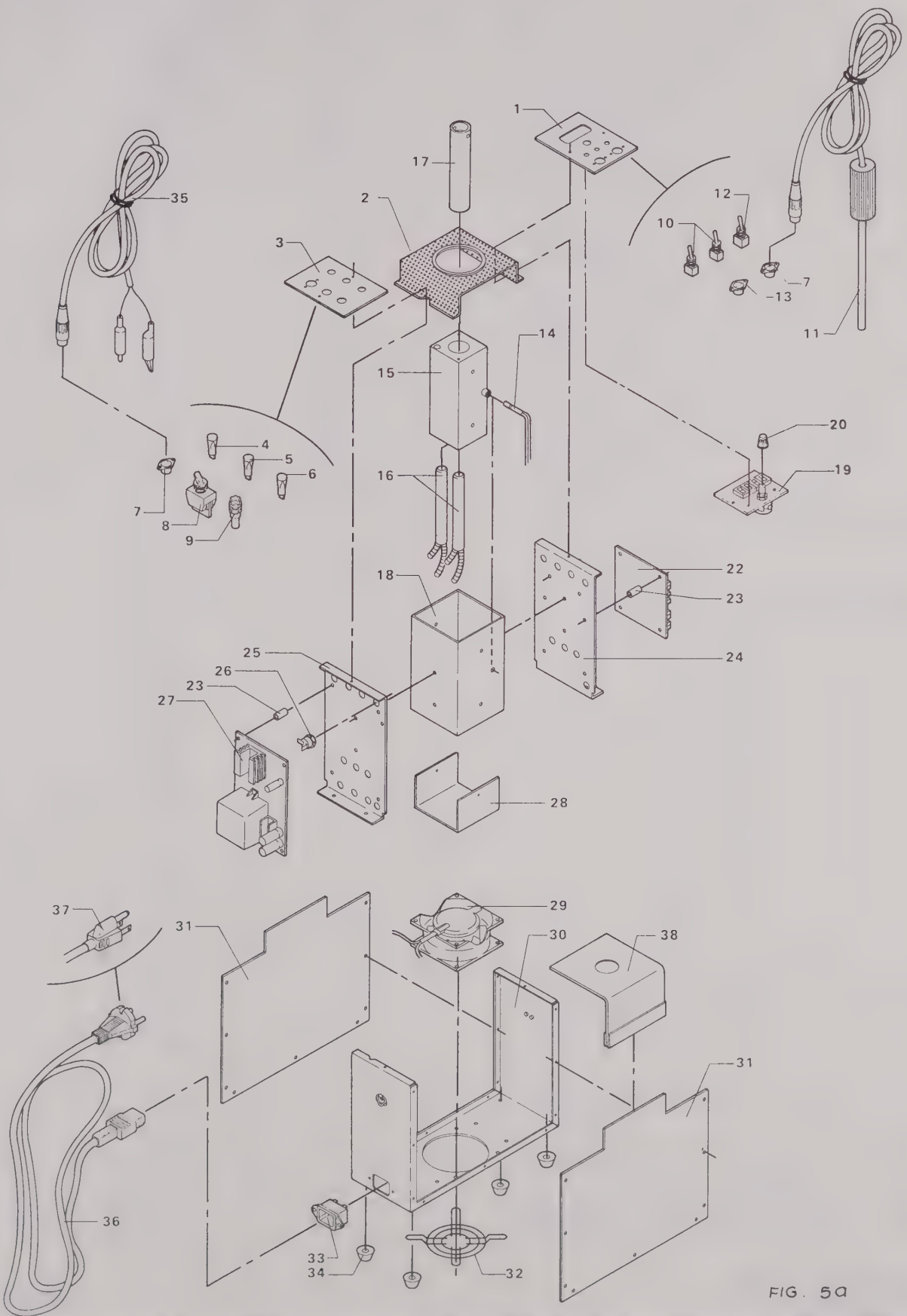


FIG. 5a

Model: 600S	Konf.:	JLO	Revision:					JOFRA INSTRUMENTS AS
	Tegn:	TI	B TI/JLO	C V/JLO				
Emne: EXPLODED VIEW	Dato:	20/3 1985	16/4 1985	2/87				Tegn nr.: 4H05C

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTIONS
1	60 DA 01 B	—		DISPLAY PANEL INCL. GLASS
2	60 DA 02 B	—		PROTECTION SHIELD
3	60 DA 03	—		CONTROL PANEL
4	60 C 884	12 V		THEMOSTAT TEST LAMP, YELLOW
5	60 C 885	115 V		ON/OFF PILOT LAMP, GREEN
6	60 C 886	115 V		HEAT PILOT LAMP, RED
7	60 B 135	3 POLE		DIN SOKKET
8	60 B 105	2 POLE		POWER SWITCH
9 A	60 B 125	—		FUSE HOLDER, COMPLETE
9 B	60 B 300	115 V		FUSE 1 1/4 x 1/4, 10 A FAST
9 C	60 B 302	220 V		FUSE 1 1/4 x 1/4, 6,3 FAST
10	60 B 120	1 POLE		SWITCH °C/°F, SEAT/READ GOLDPLATED
11	60 F 205	PT 1000		EXTERNAL RTD-PROBE, OPTION
12	60 B 115	2 POLE		SWITCH, EXT./INT., GOLDPLATED
13	60 B 140	4 POLE		DIN SOKKET
14	60 G 105	PT 1000		INT. RTD SENSOR WITH WELDED CORES
15	60 DA 008	TYPE B		HEATING WELL
16	60 DA 009	600 WATTS		HEATING ELEMENT
17	INSERTS	MRK. "B"		SUITABLE FOR THE FOLLOWING PROBE
17 A	60 F 286	1/8		DIAMETER: 3,2 mm
17 B	60 F 287	3/16		" 4,8 mm
17 C	60 F 288	1/4		" 6,4 mm
17 D	60 F 289	5/16		" 8,0 mm
17 E	60 F 290	3/8		" 9,5 mm
17 F	60 F 295	—		" 10,0 mm
17 G	60 F 291	7/16		" 11,1 mm
17 H	60 F 285			" 12,0 mm
17 I	60 F 292	1/2		" 12,7 mm
17 J	60 F 293	5/8		" 16,0 mm
17 K	60 F 294	3/4		" 19,1 mm
18	60 DA 010	—		HEAT EMISSION SHIELD
19	65 H 103	—		DISPLAY BOARD, COMPLETE
20	60 D 310	—		POTENTIOMETER TOP
22	65 H 202	—		PROCESSOR BOARD, PC 05A A
23	60 DA 012	—		SPACER
24	60 DA 013	—		HEAT PROTECTION SHIELD, RIGHT SIDE
25	60 DA 014	—		HEAT PROTECTION SHIELD, LEFT SIDE
26	60 DA 015	10 A		THERMAL OVERLOAD PROTECTOR 60°C

TOTAL
38

REF DRAWING NO
4H05C

Model		Konf	JLO	Revision
	600 S	Tegn	VAN	86
Emne:	PART LIST	Dato	10.86	25/4 -87

JOFRA INSTRUMENTS AS

SHEETS	SHEET NO
2	1

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTIONS
27 A	65 H 201 A	115 V AC		POWER BOARD COMPLETE
27 B	65 H 201 B	220 V AC		POWER BOARD COMPLETE
28	60 DA 016	—		HEAT EMISSION SHIELD
29 A	60 DA 017	115 V AC		FAN 7 WATTS
29 B	60 DA 018	220 V AC		FAN 7 WATTS
30	60 DA 019	—		STEEL CHASSIS
31	60 DA 020	—		STEELSIDEPLATE
32	60 DA 021	—		FAN PROTECTION
33	60 DA 22	—		POWER SUPPLY SOCKET
34	60 DA 023	—		RUBBER PAD
35	60 DA 024	—		THERMOSTAT TEST CABLE
36	60 F 140	220 V		POWER CABLE , 10 A
37	60 F 135	115 V		POWER CABLE , 10 A
38	60 DA 025	—		HEAT PROTECTION SHIELD

TOTAL
52

REF DRAWING NO
4H05C

Model	600S	Konf		Revision				JOFRA INSTRUMENTS A/S	
Emne	PART LIST	Tegn						SHEETS	SHEET NO
		Dato		25/4 - 87				2	2

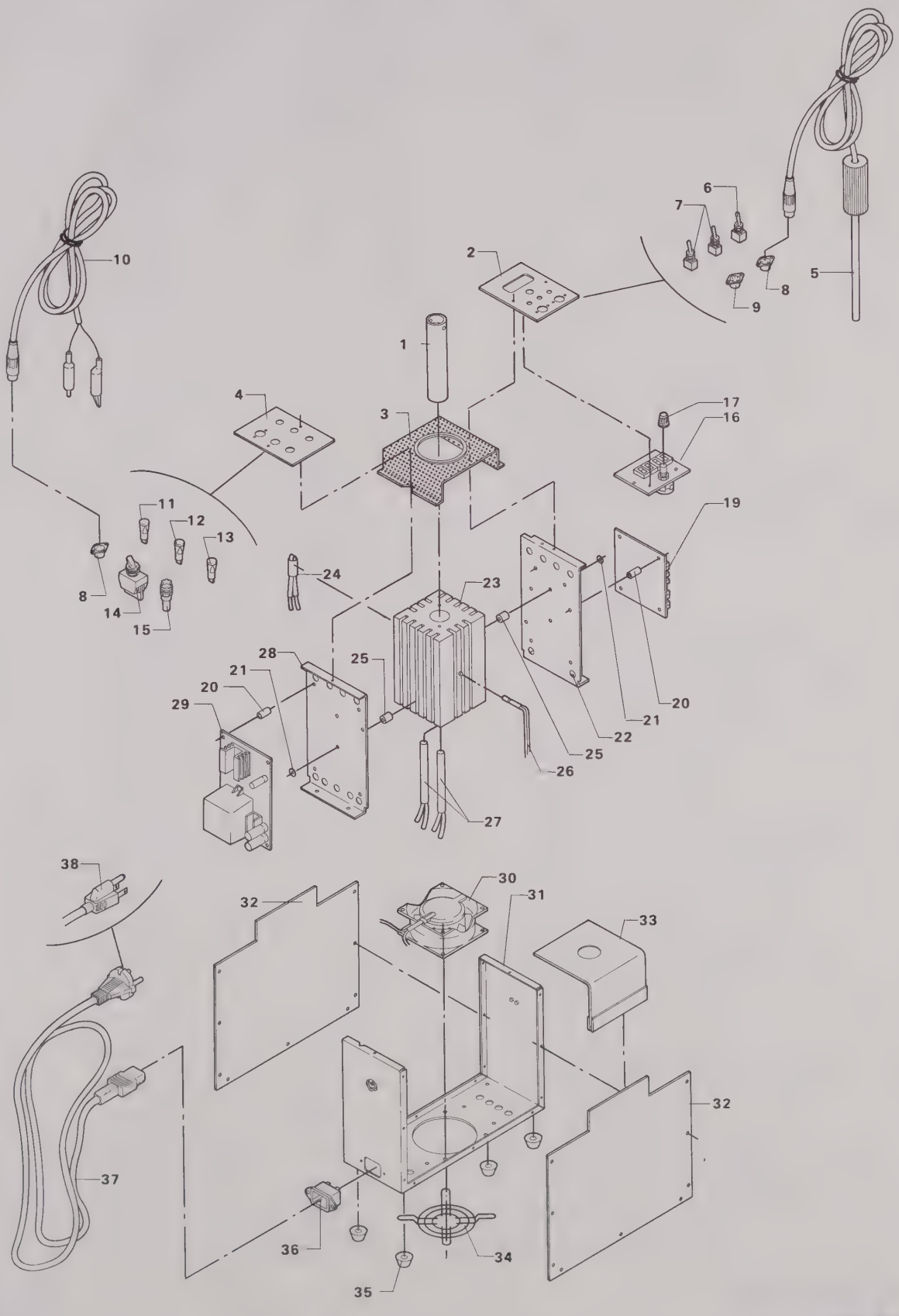


FIG. 5b

Model: 200S	Konf.:	JLO	Revision:			JOFRA
	Tegn:	TI	TI/JLO	TI/JLO		
Emne: EXPLODED VIEW	Dato:	3.85	4.85	7.85		Tegn nr.: 4L16C

ITEM	PART NO	TYPE VALUE	TOL	DESCRIPTIONS
1A	60 F 246	1/8		DIAMETER 3,2 mm
1B	60 F 247	3/16		" 4,8 mm
1C	60 F 250	1/4		" 6,4 mm
1D	60 F 252	5/16		" 8,0 mm
1E	60 F 255	3/8		" 9,5 mm
1F	60 F 256			" 10,0 mm
1G	60 F 257	7/16		" 11,1 mm
1H	60 F 258			" 12,0 mm
1I	60 F 260	1/2		" 12,7 mm
1J	60 F 265	5/8		" 16,0 mm
1K	60 F 266	3/4		" 19,1 mm
2	60 DA 35	—		DISPLAY PANEL INCL. GLASS
3	60 DA 02 B	—		PROTECTION SHIELD
4	60 DA 03	—		CONTROL PANEL
5	60 F 205	PT 1000		EXTERNAL RTD-PROBE OPTION
6	60 B 115	2 POLE		SWITCH, EXT./INT., GOLDPLATED
7	60 B 120	1 POLE		SWITCH °C/°F SET/READ GOLDPLATED
8	60 B 135	3 POLE		DIN SOKKET
9	60 B 140	4 POLE		DIN SOKKET
10	60 DA 024	—		THERMOSTAT TEST CABLE
11	60 C 884	12 V		THERMOSTAT TEST LAMP, YELLOW
12	60 C 885	115 V		ON/OFF PILOT LAMP, GREEN
13	60 C 886	115 V		HEAT PILOT LAMP, RED
14	60 B 105	2 POLE		POWER SWITCH
15A	60 B 125	—		FUSE HOLDER
15B	60 B 300	115 V		FUSE 1 1/4" x 1/4", 10 A FAST
15C	60 B 302	220 V		FUSE 1 1/4" x 1/4", 10 A FAST
16	65 L 103	—		DISPLAY BOARD, COMPLETE
17	60 D 310	—		POTENTIOMETER TOP
18	60 DA 011	—		POTENTIOMETER ASSEMBLY
19	65 L 202	—		PROCESSOR BOARD, COMPLETE
20	60 DA 012	—		SPACER
21	60 DA 026	—		HEAT RESISTANT WASHER
22	60 DA 028	—		HEAT PROTECTION SHIELD, RIGT SIDE
23	60 DA 008	TYPE B		HEATING WELL
24	60 DA 030	—		THERMAL OVER-LOARD PROTECTOR
25	60 DA 027	—		HEAT RESISTANT SPACER
26	60 G 105	PT 1000		INT. RTD SENSOR WITH WELDED CORES
27	60 DA 009	500 WATTS		HEATING ELEMENT
TOTAL 39				

REF DRAWING NO 4L16C

Model	200 S	Kont	JLO	Revision				KOFFA INSTRUMENTS AS
Emne	PART LIST	Tegn	VAN	96				SHEETS 2 / SHEET NO 1
		Dato	10.86	30/4 -87				

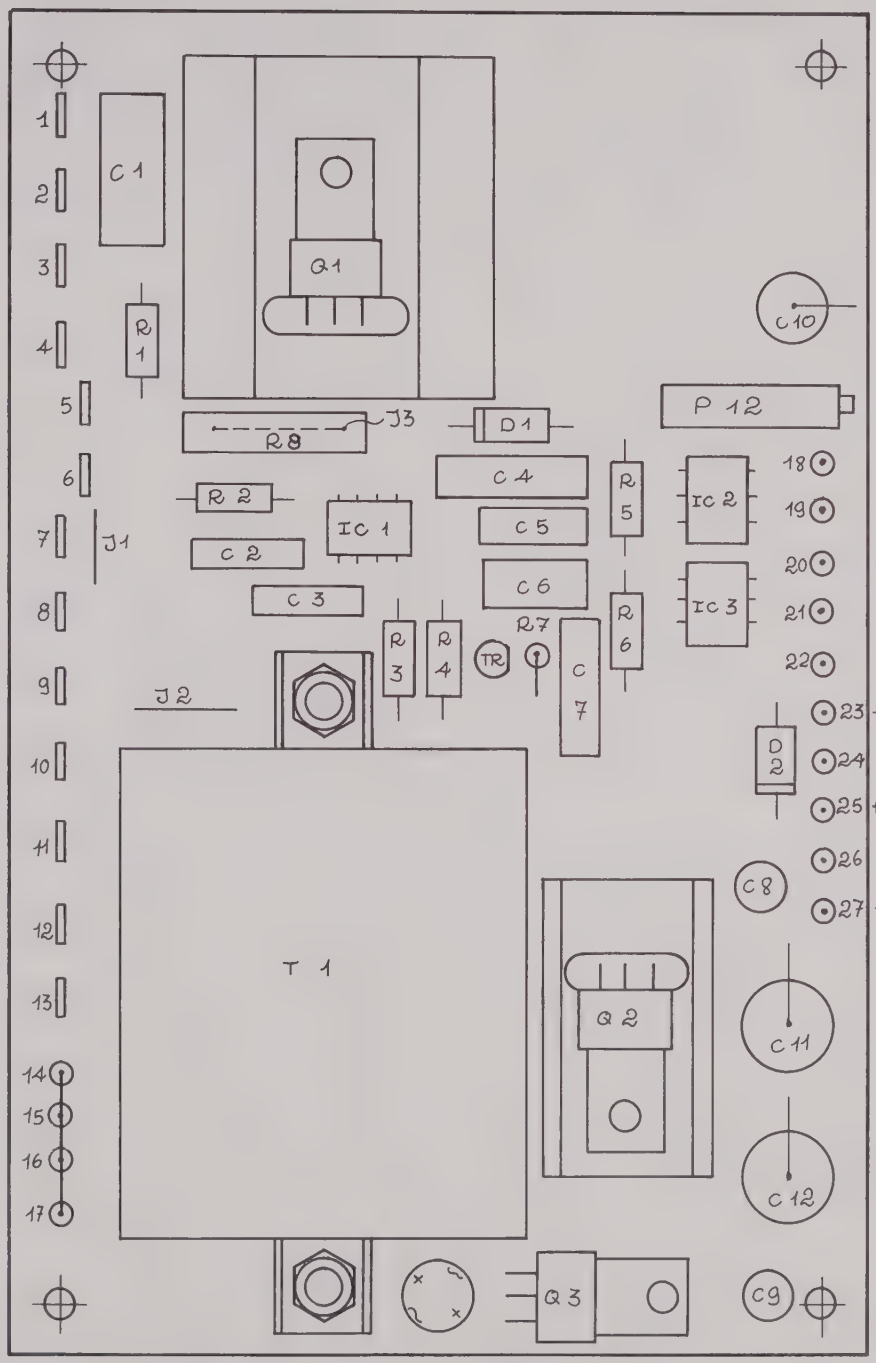
ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTIONS
28	60DA029	—		HEATING PROTECTION SHIELD, LEFT SIDE
29A	65L201A	115VAC		POWER BOARD COMPLETE
29B	65L201	220VAC		POWER BOARD COMPLETE
30A	60 DA017	7 WATTS		FAN 115 V AC
30B	60 DA018	7 WATTS		FAN 220 V AC
31	60 DA031	—		STEEL CHASSIS
32	60 DA032	—		STEELSIDEPLATE
33	60 DA025	—		HEAT PROTECTION SHIELD, OPTION
34	60 DA021	—		FAN PROTECTION
35	60 DA023	—		RUBBER PAD
36	60 DA022	—		POWER SUPPLY SOCKET
37	60 F140	220V		POWER CABLE, 10A
38	60 F135	115V		POWER CABLE, 10A

TOTAL
52

REF DRAWING NO
4L16C

Model		Konf.		Revision				JOFRA INSTRUMENTS AS	
	200S	Tegn							
Emne		Dato		30/4 -87				SHEETS	SHEET NO
	PART LIST							2	2

From s/n 63000 to 70000

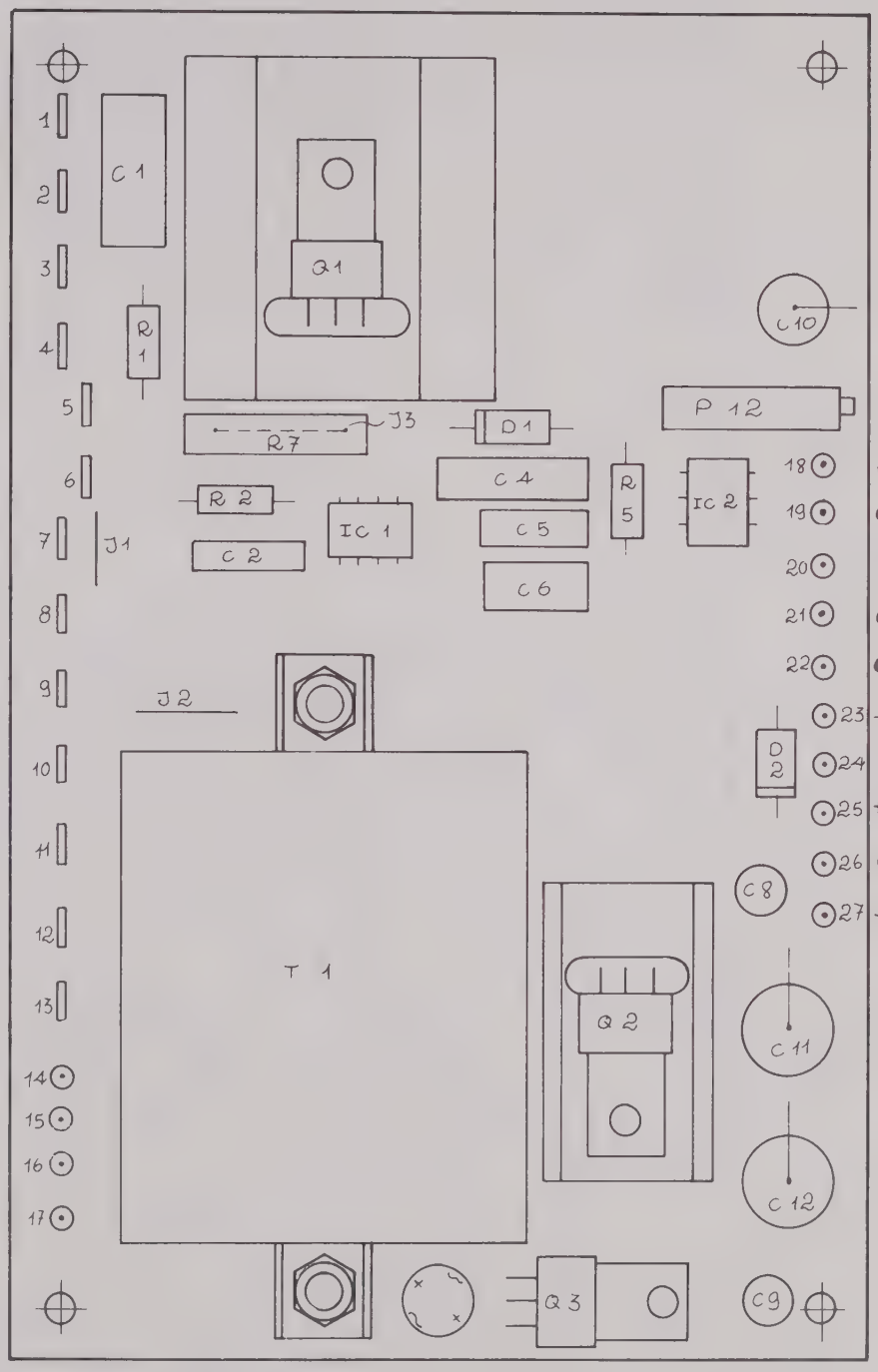


CUT 15 TO 16 FOR 115V AC SUPPLY
CUT 14 TO 15 AND 16 TO 17 FOR 220 V AC SUPPLY
CUT 1/2 R8 FOR 220 VAC SUPPLY (TO BE 8K2)

FIG 6a

Model: 2005 ALL VERSIONS		Konf.:	JLO	Revision:				JOFRA INSTRUMENTS AS
		Tegn:	VAN					
Emne: POWER BOARD	TYPE 120486 PART NO 65L 101	Dato:	9.86					Tegn nr.: 4L55

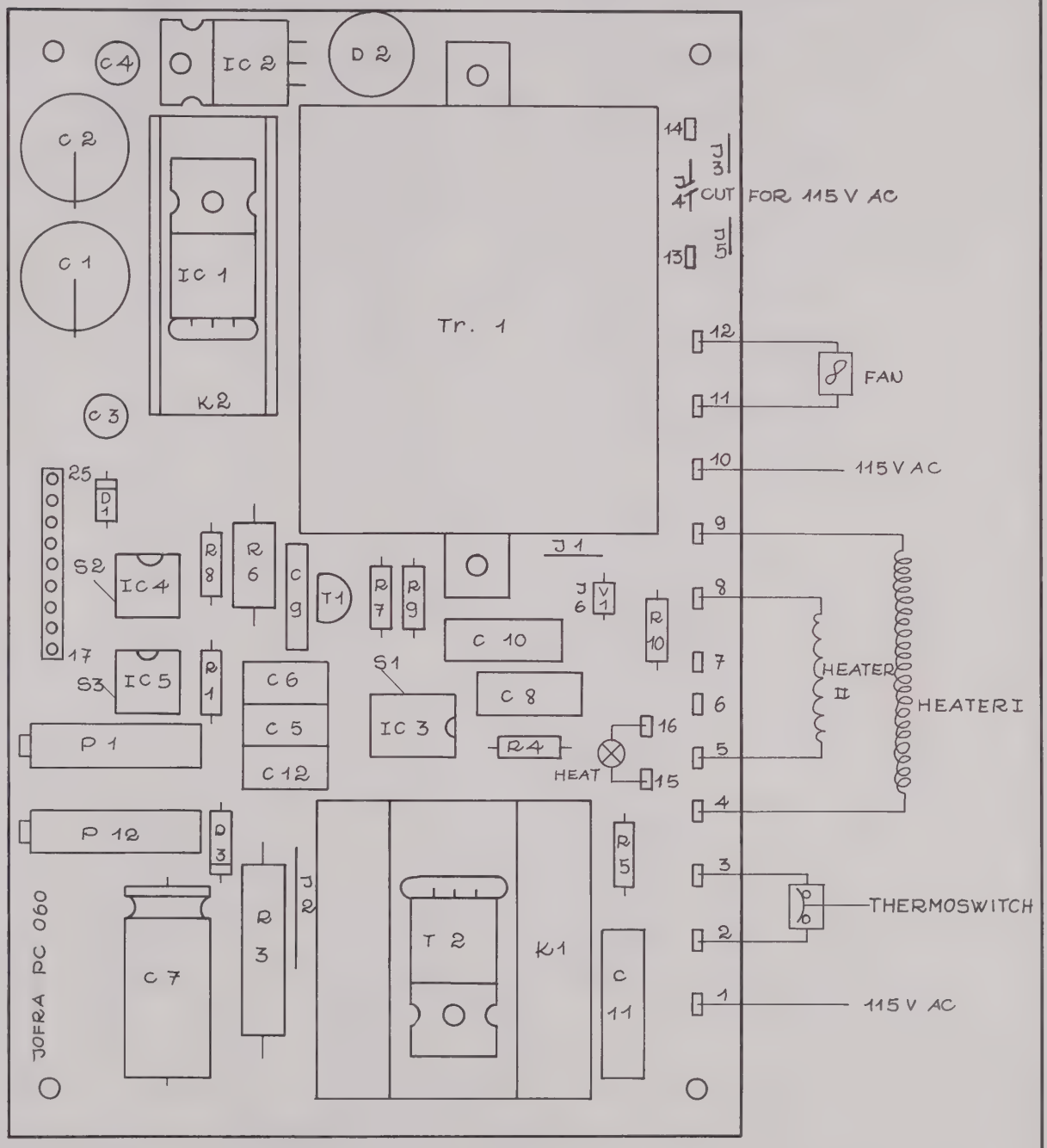
From s/n 63000 to 70000



CUT 15 TO 16 FOR 115 V AC SUPPLY
CUT 14 TO 15 AND 16 TO 17 FOR 220 V AC SUPPLY
CUT 1/2 R8 FOR 220 VAC SUPPLY (TO BE 8K2)

FIG. 6b

Model: 600S ALL VERSIONS	Konf: JLO	Revision	JOFRA INSTRUMENTS AS	
Emne: POWER BOARD TYPE 120486 PART NO 65H101	Tegn: VAN		Tegn nr: 4H56	
	Dato: 9 86			



FOR 200S ONLY : V1

FOR 600S ONLY : J6 INSTEAD OF V1, C1, R6, R7, R8, R9, C10, IC4 NOT IN CIRCUT

PIN	VOLTAGE	PC 050A
17	HEAT SIGN. HI	PIN 3
18	HEAT SIGN. LO	PIN 6
19	COOL. SIGN. HI	PIN 2
20	GROUND	PIN 7
21	GROUND	ON PILOT, TEST SOCKET, PIN 2
22	- 7 V	ON PILOT, TEST PILOT

PIN	VOLTAGE	PC 050A
23	15 V AC	PIN 1
24	+5 V	PIN 4
25	-5 V	- 5

FIG. 6C

Model: 600S / 200S 115 V.	Konf.:	JLO	Revision:			JOFRA INSTRUMENTS AS
	Tegn:	VAN				
Emne: POWER BOARD TYPE PC 060 PART NO 65H/L 201	Dato:	9/86				Tegn nr.: 4HL66

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTION
PC 060	60B436			PRINTED CIRCUT BOARD
C1	60B515	100 MF 16V		CAPACITOR FRAKO
C2	60B515	100 MF 16V		CAPACITOR FRAKO
C3	60B375	10 MF 35V		CAPACITOR FRAKO
C4	60B375	10 MF 35V		CAPACITOR FRAKO
C5	60B365	0,1 MF 100V		CAPACITOR WIMA MKS 4
C6	60B360	1,0 MF 63V		CAPACITOR WIMA MKS 3
C7	60B510	470 MF 16V		CAPACITOR FRAKO
C8	60B335	0,015 / 400		CAPACITOR WIMA MKS 4
C9	60B335	0,015 / 400		CAPACITOR WIMA MKS 4
C10	60B335	0,015 / 400		CAPATITOR WIMA MKS 4
C11	60B345	0,15 / 400		CAPATITOR WIMA MKS 4
C12	60B360	1,0 MF / 63		CAPATITOR WIMA MKS 3
CN1	60D437	9 POL		PRINT CONNECTOR MALE
D1	60B275	IN 4005		DIODE
D2	60B296	W 005		RICTIFIER
D3	60B275	IN 4005		DIODE
IC 1	60B200	L7805 CV		REGULATOR
IC 2	60B205	L7905 CV		REGULATOR
IC 3	60C160	UAA 1016		TRIAC DRIVER
IC 4	60C105	IS 608		OPTOCOUPLER
IC 5	60C115	4N 27		OPTOCOUPLER
J1	—	—		JUMPER
J2	—	—		JUMPER
K1	60D000	—		HEAT SINK
K2	60D001	—		HEAT SINK
P1	60D200	20K		TRIMMER
P12	60D130	10K		TRIMMER
R1	60C200	10K		RESISTOR 1/4 W, 50 PPm
R3	"	8K2		"
R4	"	100K		"
R5	"	100E		"
R6	"	330E, 3W		"
R7	"	4K64		"
R8	"	1K		"
R9	"	1K		"
R10	"	48K7		"
13	—	—		TERMINAL
T1	60B280	MAC 97A6		TRIAC
TOTAL 39				REF DRAWING NO 4HL66/67

Model	600S / 200S 115V/220V	Kont	JLO	Revision				JOFRA INSTRUMENTS AS	
		Tegn	VAN					SHEETS	SHEET NO
Emne	POWERBOARD TYPE PC060	Dato	9 1986					2	1

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTION
T2	60B 285	T1 613 MH		TRIAC
TR1	60G140	14841		TRANSFORMER
V1	60C755	S07K250		VARISTOR
J4	-	-		JUMPER

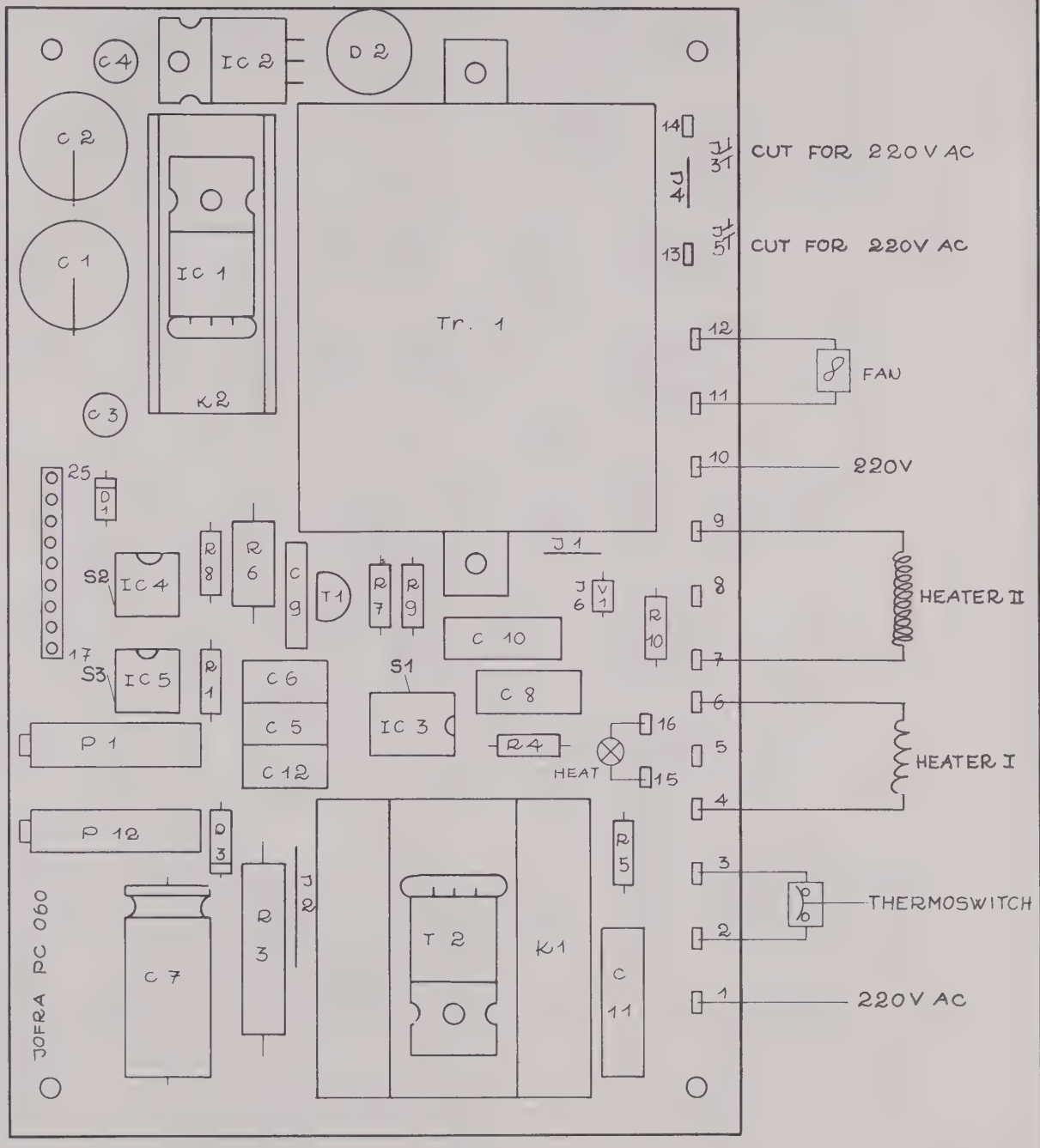
TOTAL
41

REF. DRAWING NO
4HL66/67

Model	600S/200S 115/220V	Konf.		Revision
		Tegn:	VAN	
Emne	POWERBOARD TYPE PC060	Dato:	9/86	

JOFRA INSTRUMENTS AS

SHEETS	SHEET NO
2	2



FOR 200S ONLY : V1

FOR 600S ONLY : J6 INSTEAD OF V1, C1, R6, R7, R8, R9, C10, IC4 NOT IN CIRCUT

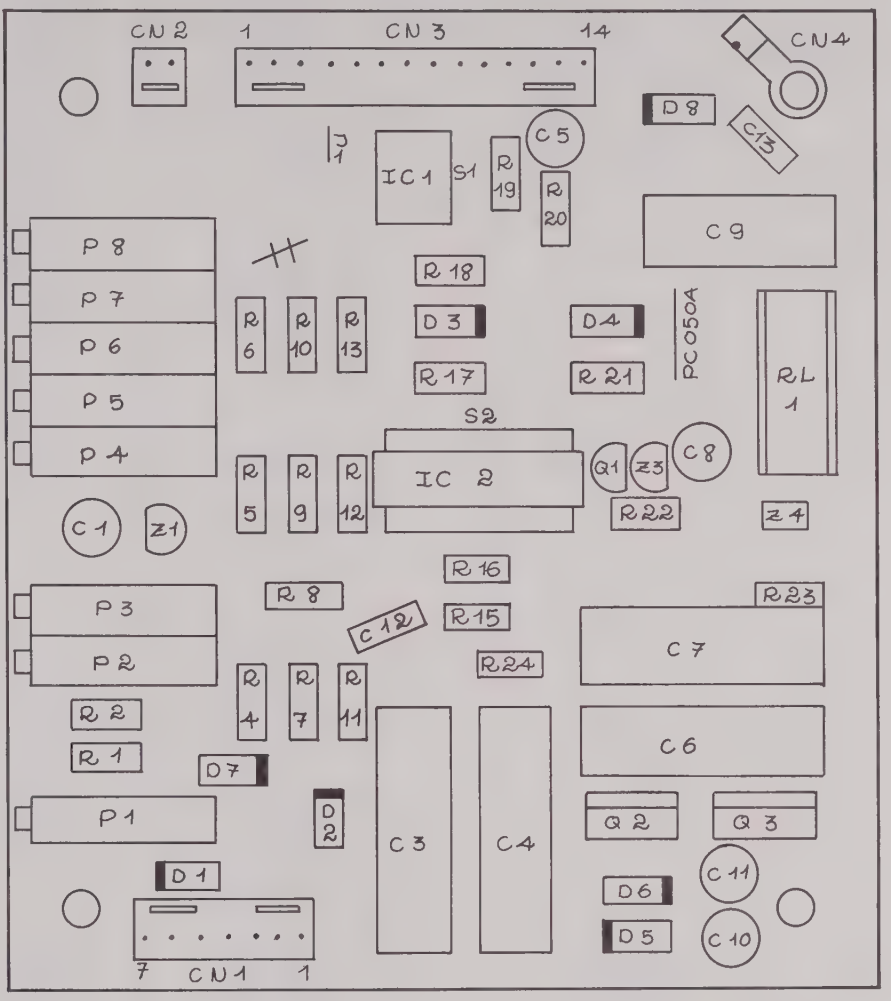
PIN	VOLTAGE	PC 050A
17	HEAT SIGN HI	PIN 3
18	HEAT SIGN LO	PIN 6
19	COOL SIGN HI	PIN 2
20	GROUND	PIN 7
21	GROUND	ON PILOT , TEST PILOT, PIN 2
22	-7V	ON PILOT , TEST PILOT

PIN	VOLTAGE	PC050A
23	15V AC	PIN 1
24	+5V	PIN 4
25	-5V	- 5

FIG. 6d

Model 600S / 200S 220V	Konf	JLO	Revision				JOFRA INSTRUMENTS AS
	Tegn	VAN					
Emne POWER BOARD TYPE PC 060 PART NO 65 H/L 201	Dato	9/86					Tegn nr 4HL67

From s/n 60000 to 70000



POT.	FUNTION
P1	HEAT SIGNAL ADJUSTMENT
P2 + P4	°C / °F CONVERSION
P3 + P5	RTD, PT-1000 OFF/SET ADJUSTMENT
P6	RTD, PT-1000 GAIN ADJUSTMENT
P7	Max. SET-VALUE ADJUSTMENT
P8	SET TO READ ADJUSTMENT
≠	NOTE: CUT LINE FOR 200S ALL VERSIONS

CN3	VOLTAGE
1 + 11	1.77 VDC / 200°C; 3,34 VDC / 600°C
2	-5V DC DISPLAY SUPPLY
3 + 14	0 TO 1V DC EXC. HEAT SIGN.
4	+5V DC DISPLAY SUPPLY
5	COMMON SET / POT DISPLAY / EXT. PROBE
6	0 TO 2V DC / 6V DC ADJUSTMENT SET POT
7	2/6V DC SUPPLY SET POT
8	0 TO 2VDC / 6V DC SET VOLTAGE
9	COMMON ANALOG OUT DISPLAY SUPPLY
10	0 TO 2VAC / 6V DC READ VOLTAGE
12	0,32 TO 3,92 / 11.12V DC
13	0 TO 2V DC / 6V DC SET / READ VOLTAGE

CN2	VOLTAGE
1	COMMON RTD
2	1.77V DC / 200°C ; 3.34 VDC / 600°C

CN1	VOLTAGE
1	18 V AC SUPPLY
2	0 to -1 V EXC. VOLT. FAN (200S)
3	COMMON, HEAT
4	+5V DC
5	-5V DC
6	0 TO 1V EXC. VOLTAGE HEAT
7	COMMON

CN4	COMMON

FIG. 6e
HAL 2:1

Model: 200S / 600S ALL VERSIONS		Konf.:	JLO	Revision:			JOFRA INSTRUMENTS A/S	
		Tegn:	VAN	JLO	JLO			
Emne: PROCESSBOARD	TYPE PC050A PART NO 65HL02	Dato:	5.86	10.86	30/4 -87		Tegn nr.: 4HL42	

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTIONS
C1	60 C 375	10 / 35		ELEKTROLYT KONDENSATOR
C3	60 B 510	470 / 16		KONDENSATOR
C4	60 B 510	470 / 16		KONDENSATOR
C5	60 B 375	10 / 35		ELEKTROLYT KONDENSATOR
C6	60 B 505	220 / 40		ELEKTROLYT KE-1 FRAKO KON.
C7	60 B 505	"		"
C8	60 B 375	10 / 35		ELEKTROLYT KONDENSATOR
C9	60 B 500	100 / 40		"
C10	60 C 375	10 / 35		"
C11	"	"		"
C12	60 B 365	0,1 / 100		WIMA MKS-4
C13	60 B 365	0,1 / 100		WIMA MKS-4
D1	60 B 275	1N4005		DIODE
D2	60 B 275	"		"
D3	"	"		"
D4	"	"		"
D5	"	"		"
D6	"	"		"
D7	"	"		"
D8	60 B 275	1N4005		DIODE
P1	60 D 200	20K		TRIMMER
P2	60 D 120	2K		"
P3	60 D 110	500 R		"
P4	60 D 130	10K		"
P5	60 D 110	500 R		"
P6	60 D 120	2K0		"
P7	60 D 100	500 R		"
P8	60 D 200	20K		TRIMMER
IC1	60 C 153	LM741 CN		OPAMP
IC2	60 C 185	LM 324 N		"
CN1	60 D 435	6410-7-A		7 POL MALE
CN2	60 D 425	6410-2-A		2 POL MALE
CN3	60 D 440	6410-14-A		14 POL MALE
CN4	60 B 150	305340		LODE SPYD
Q1	60 B 230	BC 547 B		TRANSISTOR
Q2	60 B 220	L7912 CV		REGULATOR
Q3	60 B 225	L7815 CV		REGULATOR
Z1	60 B 255	LM329Z 6,9		ZENER DIODE 6,9 V
Z3	60 B 250	LM336Z 2,5		ZENER DIODE 2,5 V
Z4	60 B 251	5V1 Z		ZENER DIODE 5,1 V
S1	60 C 020	14 PIN		IC SOKKEL
S2	"	"		"
S3	60 C 010	8 PIN		IC SOKKEL
J1				JUMPER
PCB	60 B 440	PC050A		PRINTED CIRCUIT BOARD

TOTAL 43

REF DRAWING NO 4HL42

Model: 200S / 600S

Emne: PROCESS BOARD TYPE PC050A PART NO 65HL02

Konf.:	JLO	Revision:				
Tegn:	VAN	86				
Dato:	8.86	4/4 -87				

JOFRA INSTRUMENTS AS

SHEETS 2 | SHEET NO 1

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTIONS
R1	60 C 390	5 K 62		RESISTOR 1/4 W
R2	60 C 330	2 K 05		"
R4	60 C 510	48 K 7		"
R5	60 C 400	6 K 81		"
R6	60 C 340	2 K 2		"
R7	60 C 310	1 K		"
R8	60 C 550	110 K		"
R9	60 C 410	8 K 25		"
R10	60 C 450	14 K 3		"
R11	60 C 625	464 K		"
R12	60 C 420	10 K		"
R13	"	"		"
R15	60 C 290	560 K		"
R16	60 C 625	464 K		"
R17	60 C 530	56 K 2		"
R18	60 C 360	2 K 37		"
R19	60 C 410	8 K 25		"
R20	60 C 540	100 K		"
R21	60 C 560	121 K		"
R22	60 C 380	4 K 64		"
R23	60 C 540	100 K		"
R24	60 C 540	100 K		RESISTOR 1/4 W
RL1	60 C 101	GR 108 A 1		REED RELÆ

TOTAL 66

REF DRAWING NO 4HL42

Model: 200 S / 600 S

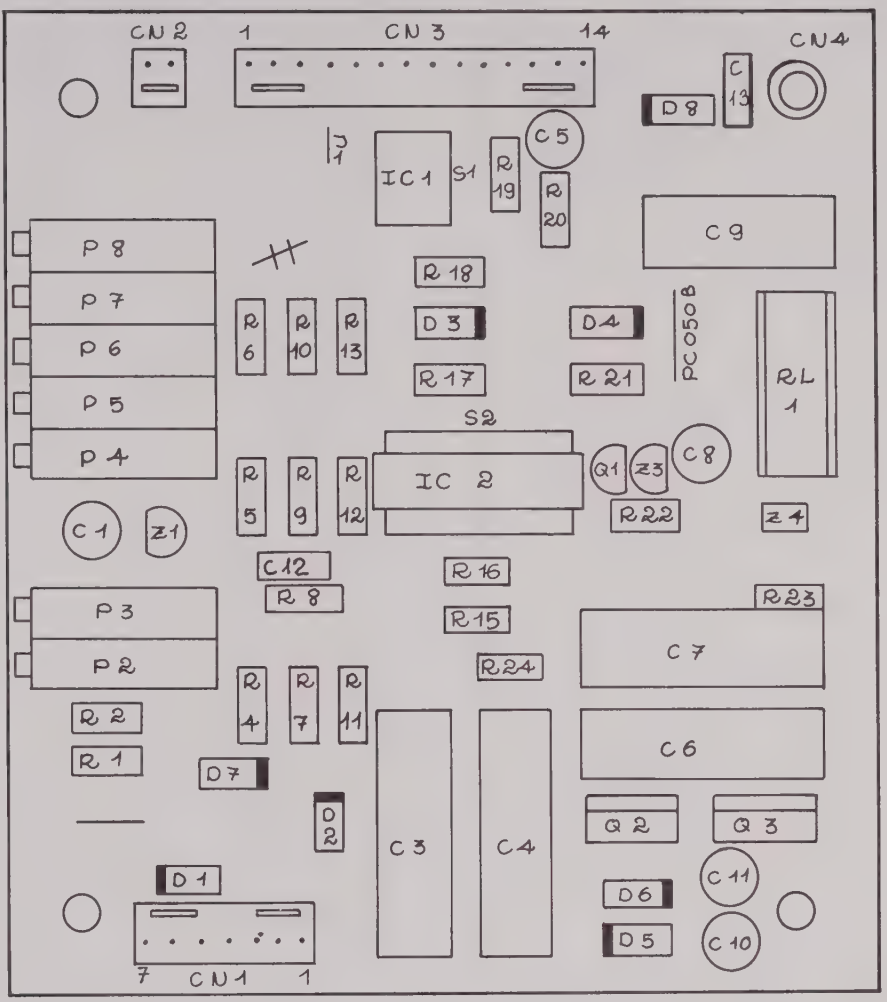
Emne: PROCESS BOARD TYPE PC050A PART NO 65HL02

Konf.:	JLO	Revision:				
Tegn:	VAN	JLO				
Dato:	8.86	4/4 -87				

JOFRA INSTRUMENTS AS

SHEETS	SHEETS NO
2	2

* FOR USE WITH POWER BOARD TYPE PC 060 ONLY * FROM S/N 70000



POT.	FUNTION
P2 + P4	°C / °F CONVERSION
P3 + P5	RTD, PT-1000 OFF / SET ADJUSTMENT
P6	RTD, PT-1000 GAIN ADJUSTMENT
P7	Max. SET-VALUE ADJUSTMENT
P8	SET TO READ ADJUSTMENT
≠ NOTE:	CUT LINE FOR 200S ALL VERSIONS

CN3	VOLTAGE
1 + 11	1.77 VDC / 200°C; 3,34 VDC / 600°C
2	-5V DC DISPLAY SUPPLY
3 + 14	0 TO 1V DC EXC. HEAT SIGN.
4	+5V DC DISPLAY SUPPLY
5	COMMON SET / POT DISPLAY / EXT. PROBE
6	0 TO 2V DC / 6V DC ADJUSTMENT SET POT
7	2/6V DC SUPPLY SET POT
8	0 TO 2VDC / 6V DC SET VOLTAGE
9	COMMON ANALOG OUT DISPLAY SUPPLY
10	0 TO 2VAC / 6V DC READ VOLTAGE
12	0,32 TO 3,92 / 11 12V DC
13	0 TO 2V DC / 6V DC SET / READ VOLTAGE

CN2	VOLTAGE
1	COMMON RTD
2	1.77V DC / 200°C ; 3 34 VDC / 600°C

CN1	VOLTAGE
1	18 V AC SUPPLY
2	0 TO -1 V EXC. VOLT. FAN (200S)
3	COMMON, HEAT
4	+5V DC
5	-5V DC
6	0 TO 1V EXC VOLTAGE HEAT
7	COMMON

CN4	COMMON

FROM S/N 70000

HÅL 2:1 FIG. 6f

Model: 200S / 600S ALL VERSIONS	Konf.:	JLO	Revision:				JOFRA INSTRUMENTS A/S
	Tegn.	VAN	JLO	JLO	JLO		
Emne: PROCESS BOARD TYPE PC 050B PART NO 65 H/L 202	Dato:	5.86	7.86	10.86	30/4 -87		Tegn nr.: 4HL74

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTIONS
C1	60 C 375	10 / 35		ELEKTROLYT KONDENSATOR
C3	60 B 510	470 / 16		KONDENSATOR
C4	60 B 510	470 / 16		KONDENSATOR
C5	60 B 375	10 / 35		ELEKTROLYT KONDENSATOR
C6	60 B 505	220 / 40		ELEKTROLYT KE-1 FRAKO KON.
C7	60 B 505	"		"
C8	60 B 375	10 / 35		ELEKTROLYT KONDENSATOR
C9	60 B 500	100 / 40		"
C10	60 C 375	10 / 35		"
C11	"	"		"
C12	60 B 365	0,1 / 100		WIMA MKS-4
C13	60 B 365	0 1 / 100		WIMA MKS-4
D1	60 B 275	1N 4005		DIODE
D2	60 B 275	"		"
D3	"	"		"
D4	"	"		"
D5	"	"		"
D6	"	"		"
D7	"	"		"
D8	60 B 275	1N4005		DIODE
P2	60 D 120	2K		TRIMMER
P3	60 D 110	500 R		"
P4	60 D 130	10K		"
P5	60 D 110	500 R		"
P6	60 D 120	2K0		"
P7	60 D 100	500 R		"
P8	60 D 200	20K		TRIMMER
IC1	60 C 153	LM741 CN		OPAMP
IC2	60C 185	LM 324 N		"
CN1	60D 435	6410-7-A		7 POL MALE
CN2	60D 485	6410-2-A		2 POL MALE
CN3	60 D 440	6410-14-A		14 POL MALE
CN4	60 B 150	305340		LODE SPYD
Q1	60 B 230	BC 547 B		TRANSISTOR
Q2	60 B 220	L7912 CV		REGULATOR
Q3	60 B 225	L7815 CV		REGULATOR
Z1	60 B 255	LM329 Z 6,9		ZENER DIODE 6,9 V
Z3	60 B 250	LM336 Z 2,5		ZENER DIODE 2,5 V
Z4	60 B 251	5V1 Z		ZENER DIODE 5,1 V
S1	60 C 020	14 PIN		IC SOKKEL
S2	"	"		"
S3	60 C 010	8 PIN		IC SOKKEL
J1				JUMPER
PCB	60 B 440	PC 050 B		PRINTED CIRCUIT BOARD

TOTAL 43

REF DRAWING NO 4HL 74

Model: 200S . 600S

Emne: PARTS LIST 65 H/L 202

Konf.:		Revision:				
Tegn:	JO					
Dato:	27/4 -87					

JOFRA

SHEETS 2 | SHEET NO 1

ITEM	PART NO	TYPE VALUE	TOL	DESCRIPTIONS
R1	60 C 390	5 K 62		RESISTOR 1/4 W
R2	60 C 330	2 K 05		"
R4	60 C 510	48 K 7		"
R5	60 C 400	6 K 81		"
R6	60 C 340	2 K 2		"
R7	60 C 310	1 K		"
R8	60 C 550	110 K		"
R9	60 C 410	8 K 25		"
R10	60 C 450	14 K 3		"
R11	60 C 625	464 K		"
R12	60 C 420	10 K		"
R13	"	"		"
R15	60 C 290	560 K		"
R16	60 C 625	464 K		"
R17	60 C 530	56 K 2		"
R18	60 C 360	2 K 37		"
R19	60 C 410	8 K 25		"
R20	60 C 540	100 K		"
R21	60 C 560	121 K		"
R22	60 C 380	4 K 64		"
R23	60 C 540	100 K		"
R24	60 C 540	100 K		RESISTOR 1/4 W
RL1	60 C 101	GR 108 A 1		REED RELÆ

TOTAL 66

REF DRAWING NO 4HL

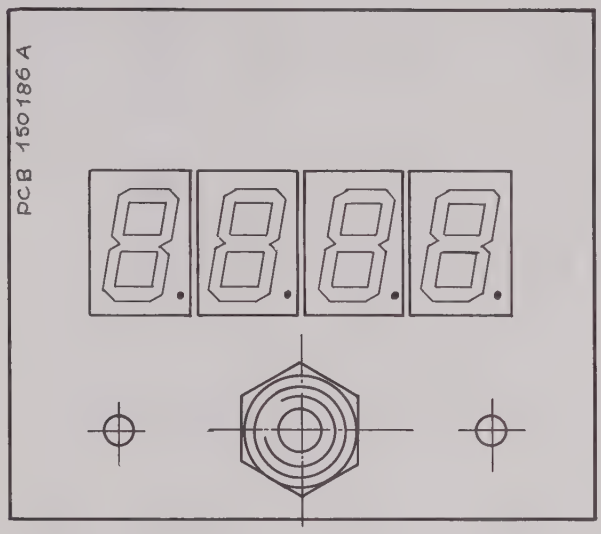
Model: 200 S 600 S

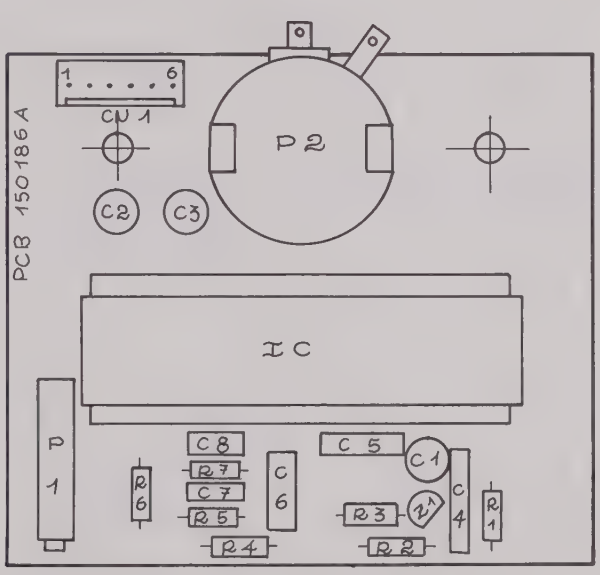
Emne: PARTS LIST 65 H/L 202

		Revision:				
Konf.:						
Tegn:	JLo					
Dato:	27/4 -87					

JOFRA

SHEETS	SHEETS NO
2	2





CN1	VOLTAGE
PIN 1	0 TO 6VDC / 11. 12 V DC (°C/°F)
PIN 2	NO CONNECTION
PIN 3	COMMON
PIN 4	COMMON
PIN 5	-5V DC SUPPLY
PIN 6	+5V DC SUPPLY

POT.	FUNCTION
1	FINE CALIBRATON
2	SET POTENTIOMETER

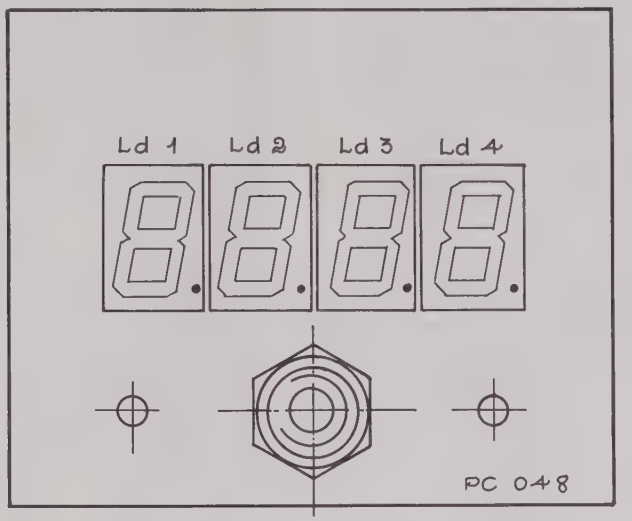
FIG. 6g

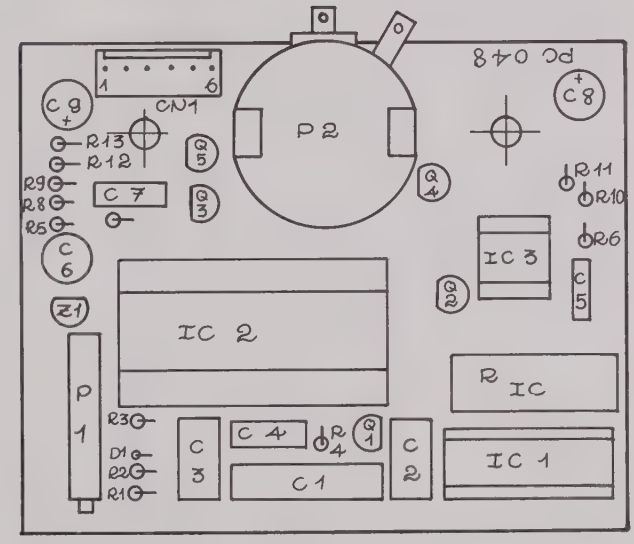
Model: 600 S ALL VERSIONS		Konf.:	JLO	Revision:				JOFRA INSTRUMENTS AS
		Tegn:	VAN	JLO				
Emne: TYPE PC 150186A PART 65H 103 DISPLAY BOARD COMPLETE		Dato:	7.86	30/4 -87				Tegn nr.: 4H44

ITEM	PART NO	TYPE VALUE	TOL.	DESCRIPTION
R1	60C200	100K	1%	RESISTOR 1/4 W, 50 ppm
R2	"	10K	"	"
R3	"	22K6	"	"
R4	"	100K	"	"
R5	"	100K	"	"
R6	"	1M	"	"
R7	"	464K	"	"
C1	60B375	10µF/35V	10%	EL. CAPACITOR
C2	"	"	"	"
C3	"	"	"	"
C4	60B370	100pF/400V	"	CAPACITOR WIMA
C5	60B365	0.1µF/100V	"	" "
C6	"	"	"	" "
C7	60B340	0.047µF/63V	"	" "
C8	60B350	0.22µF/63V	"	" "
P1	60D130	10K	10%	TRIMMER
P2	60D255	1K	LIN. 0.15%	SET POTENTIOMETER CONTELEC TYPE 2310
Z1	60B245	ICL 8069	20 ppm	VOLTAGE REFERENCE 1.2V
IC1	60C180	ICL 7107 CPL	-	A/D CONVERTER - DRIVER
LD1	60C130	HP-HDSP 5301	-	7 SEGMENT LED
LD2	"	"	-	"
LD3	"	"	-	"
LD4	"	"	-	"
CN1	60D430	MOLEX 6410-06A	-	6-POLE MALE CONNECTOR
PCB	60B414	150186A	-	PRINTED CIRCUIT BOARD
TOTAL				

REF. DRAWING NO
4H44

Model:	600S DISPLAY BOARD 150186A	Konf		Revision				JOFRA	
Emne:	PARTS LIST 65H103	Tegn:	flo					SHEETS	SHEET NO
		Dato:	30/4 -87					1	1





CN1	VOLTAGE
PIN 1	0 TO 6VDC / 11.12VDC
PIN 2	NO CONNECTION
PIN 3	COMMON
PIN 4	COMMON
PIN 5	-5V DC SUPPLY
PIN 6	+5V DC SUPPLY

FIG. 6h

Model: 200S ALL VERSIONS	Konf.:	JLO	Revision:				JOFRA INSTRUMENTS AS
	Tegn:	VAN					
Emne: TYPE PC048 PART 65L103 DISPLAY BOARD COMPLETE	Dato:	7.86					Tegn nr.: 4L54

ITEM	PART NO	TYPE VALUE	TOL	DESCRIPTIONS
PC 048	60 B 400			PRINT BOARD
C1	60 B 340	047 / 63		KONDENSATOR MKC-4
C2	60 B 361	1,0 / 63		KONDENSATOR MKS-3
C3	60 B 361	1,0 / 63		KONDENSATOR MKS-3
C4	60 B 365	0,1 / 100		KONDENSATOR MKS-4
C5	60 B 380	470 PF		KONDENSATOR FKC-2
C6	60 B 375	10 / 35		ELEKTROLYT KONDENSATOR
C7	60 B 365	0,1 MF		KONDENSATOR MKS-4
C8	60 B 375	10 / 35		ELEKTROLYT KONDENSATOR
C9	"	"		"
CN1	60 D 430	6 PIN		CONNECTOR
D1	60 B 265	IN 4448		DIODE
IC 1	60 C 145	SN74LS47N		BCD / 7 - SEGMENT
IC 2	60 C 190	ICL 7135 CPI		4 1/2 DIGIT A/D CON.
IC 3	60 C 105	ICM 7555 IPA		TIMER
Ld 1	60 C 185	HDSP 5301		7 SEGMENT LED
Ld 2	"	"		"
Ld 3	"	"		"
Ld 4	"	"		7 SEGMENT LED
P1	60 D 110	500 R		TRIMPOTENTIOMETER
P2	60 D 115	1K		TRIMPOTENTIOMETER
Q1	60 B 230	BC 547 B		TRANSISTOR
Q2	"	"		"
Q3	"	"		"
Q4	"	"		"
Q5	60 B 230	BC 547 B		TRANSISTOR
R1	60 C 540	100K		RESISTOR 1/4 W
R2	60 C 200	27E		"
R3	60 C 540	100K		"
R4	60 C 510	48 K 7		"
R5	60 C 360	2K 37		"
R6	60 C 468	22 K		"
R7	60 C 540	100 K		"
R8	60 C 420	10 K		"
R9	60 C 390	5K62		"
R10	60 C 380	4 K64		"
R11	60 C 282	390 E		"
R12	60 C 550	110 K		"
R13	60 C 630	1 M		"
RIC	60 C 080	7 x 150 R		RESISTOR NETWORK
SIC1	60 C 030	16 PIN		IC SOKKEL
SIC2	60 C 040	28 PIN		"
SIC3	60 C 010	8 PIN		IC SOKKEL
Z1	60 B 245	ICL 8069		ZENER DIODE 1,2 V

TOTAL
44

REF DRAWING NO
4L54

Model		Kont	JLO	Revision				
	200 S ALL VERSION	Tegn	VAN					1
Emne		Dato	10.86					
	TYPE PC 048 PART 65L102							

JOFRA INSTRUMENTS AS

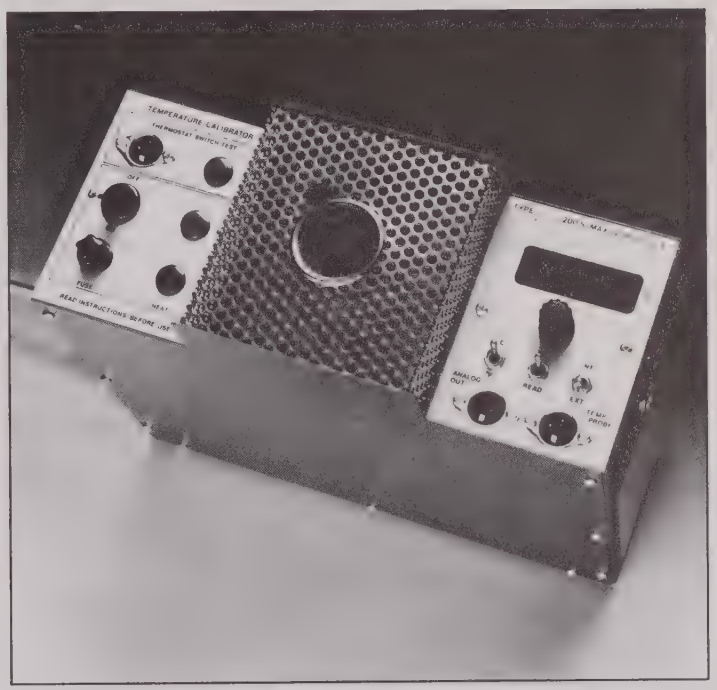
SHEETS	SHEET NO
1	1

PRECISION FIELD TEMPERATURE CALIBRATOR

An electronic heat generating instrument outdating oil baths and similar

Features
- Ambient to 200°C/392°F.
- Portable temperature standard.
- Approx. 6 min. to generate 200°C/392°F.
- Resolution 1/10 of a degree.
- No dangerous liquid.
- Calibration at site.

Applications
- Testing of temperature sensors and systems.
- Adjustment of critical temperatures and controls.
- Control of alarm limits.
- Reduction of energy consumption.
- More reliable process temperature.



JOFRA MODEL 200 S

Description:
The JOFRA Model 200 S consists of a special aluminium alloy block which can be accurately heated within a few minutes. The temperature is electronically controlled and regulated, set and read to a resolution of 1/10 of a degree C or F, on the large 4 digits display.

The test and calibration of thermometers, temperature sensors, RTDs as well as thermocouples and temperature switches are easily made by comparison with the temperature of the heating block. Optimum contact is secured by using different sizes of insertion tubes.

Testing of the on/off function of temperature switches and thermostats is easily carried out with the Model 200 S.

Furthermore, there is a provision for connection to recorders, remote indicators etc. via an analog output. An optional external probe can also be plugged into the Model 200 S precision electronic calibrator, allowing the 200 S to be used as an accurate digital thermometer.

Additional models with deeper well available.

Traceability:
Each instrument is calibrated against precision temperature calibration equipment which is traceable to the UK National Physical Laboratory (NPL), U.K., and can be delivered with a test certificate from the Danish National Test Board.

CHARACTERISTICS

Standard delivery:
- instrument
- insertion tube for ¼" probe
- insertion tube for ½" probe
- tool for insertion tubes
- mains cable
- thermostat test cable
- instruction manual
- aluminium carrying case.

Optional extras:
- External probe, part no. 60F205.
- Thermal protection shield, part. no. 60G155.
- Additional insertion tubes available.
  Please contact distributor.

Please specify part no. and required optional extras:

Part No.	Model	Well depth mm/inch	Voltage
200S220	200 S	120/4.8	220 V
200S220200	200 S 2	200/8.0	220 V
200S220320	200 S 3	320/12.0	220 V
200S115	200 S	120/4.8	115 V
200S115200	200 S 2	200/8.0	115 V
200S115320	200 S 3	320/12.0	115 V

Model		200 S	200 S 2	200 S 3
Temperature range	°C/°F	Ambient to 200/392		
Resolution	°C/°F	0.1/0.1		
Accuracy *) (Temp. above 50°C/122°F)		± (0.3% + 1 digit) of F.S.		± (0.5% + 1 digit) of F.S.
Stability	°C/°F	± 0.1/0.2		± 0.3/0.5
Heating time (ambient to 200°C/392°F)	min.	6	6	15
Cooling time (600°C/ 1112°F to 100°C/212°F)	min.	17	21	30
Well depth	mm/inch	120/4.8	200/8	320/12
Well diameter	mm/inch	26/1.024		
Analog output (F.S.) (> 100 kΩ)	VDC	10 mV per degree C or F		
Temp. switch, Supply	VDC nominal	7		
Line Voltage	VAC	220 ± 10%, 50/60 Hz 115 ± 10%, 60 Hz		
Power Cons., max		1000 Watt		
Dimensions: W D H	mm/inch mm/inch mm/inch	260/10.3 105/4.2 230/9.1	260/10.3 105/4.2 310/12.2	260/10.3 105/4.2 350/13.8
Weight	kg/lbs	5/11	7/15	8/18
Shipping weight	kg/lbs	11/24	13/29	14/31
Shipping dimensions W D H	mm/inch mm/inch mm/inch	450/17.7 290/11.4 310/12.2	400/15.8 500/19.7 200/8.0	400/15.8 500/19.7 200/8.0

JOFRA INSTRUMENTS A/S is the world's leading manufacturer of a range of portable precision field calibrators for pressure, heating and cooling,- traceable to international standards.

This publication is for information only. We reserve the right to amend or to alter above characteristics without prior notice.

*) Measured at bottom of well

PRECISION FIELD HIGH TEMPERATURE CALIBRATOR

An electronic heat generating instrument for safe and rapid testing.

Features
- Ambient to 600°C/1112°F.
- Portable temperature standard.
- Approx. 10 min. to generate 600°C/1112°F.
- No dangerous liquid.
- Calibration at site.

Applications
- Testing of temperature sensors and systems.
- Adjustment of critical temperatures.
- Control of alarm limits.
- Reduction of energy consumption.
- More reliable process temperature.

JOFRA MODEL 600 S

Description:
The JOFRA Model 600 S consists of a special purified and surface treated copper block which can be accurately heated within a few minutes. The temperature is electronically controlled and regulated, set and read to a resolution of one degree C or F, on the large 3 1/2 digits display.

The test and calibration of thermometers, temperature sensors, RTDs as well as thermocouples and temperature switches are easily made by comparison with the temperature of the heating block.

Optimum contact is secured by using different sizes of insertion tubes.

Testing of the on/off function of temperature switches and thermostats is easily carried out by use of the Model 600 S.

Furthermore, there is a provision for connection to recorders, remote indicators etc. via an analog output. An optional external probe can also be plugged into the Model 600 S precision electronic calibrator, allowing the 600 S to be used as an accurate digital thermometer.

Additional models with deeper well available.

Traceability:
Each instrument is calibrated against precision temperature calibration equipment which is traceable to the UK National Physical Laboratory (NPL), U.K., and can be delivered with a test certificate from the Danish National Test Board.

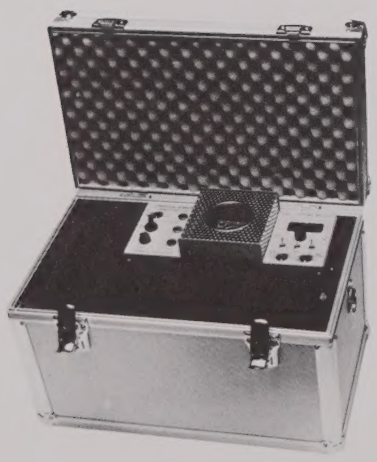
CHARACTERISTICS

Standard delivery:
- instrument
- insertion tube for ¼" probe
- insertion tube for ½" probe
- tool for insertion tubes
- mains cable
- thermostat test cable
- instruction manual
- aluminium carrying case.

Please specify part no. and required optional extras:

Part No.	Model	Well depth mm/inch	Voltage
600S220	600 S	120/4.8	220 V
600S220200	600 S 2	200/8.0	220 V
600S115	600 S	120/4.8	115 V
600S115200	600 S 2	200/8.0	115 V

Optional extras:
- External probe, part no. 60F205
- Thermal protection shield, part. no. 60G155
- Additional insertion tubes available.
  Please contact distributor.



Model			600 S	600 S 2
Temperature range		°C/°F	Ambient to 600/1112	
Resolution		°C/°F	1/1	
Accuracy *) (Temp. above 100°C/212°F)			± (0.1% + 1 digit) of F.S.	± (0.15% + 1 digit) of F.S.
Stability		°C/°F	± 0.5/1	± 0.5/1
Heating time (ambient to 600°C/1112°F)		min.	12	40
Cooling time (600°C/1112°F to 100°C/212°F)		min.	60	180
Well depth		mm/inch	120/4.8	200/8
Well diameter		mm/inch	26/1.024	
Analog output (F.S.) (> 100 kΩ)		VDC	10 mV per degree C or F	
Temp. switch, Supply		VDC nominal	7	
Line Voltage		VAC	220 ± 10%, 50/60 Hz 115 ± 10%, 60 Hz	
Power Consumption, max			1200 Watt	
Dimensions:	W D H	mm/inch mm/inch mm/inch	260/10.3 105/4.2 230/9.1	260/10.3 105/4.2 310/12.2
Weight		kg/lbs	7/15	9/20
Shipping weight		kg/lbs	13/29	16/35
Shipping dimensions	W D H	mm/inch mm/inch mm/inch	450/17.7 290/11.4 310/12.2	400/15.8 200/8.0 500/19.7

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*) Measured at bottom of well

CHARACTERISTICS